EXHIBIT A

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of:	Wang et al.	
U.S. Patent No.:	8,429,480	Attorney Docket No.: 35548-0130IP1
Issue Date:	April 23, 2013	
Appl. Serial No.:	12/681,687	
§371(c)(1), (2), (4) Date:	June 24, 2010	
Title:	USER SPECIFIC LOAD BALANCING	

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PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 8,429,480 PURSUANT TO 35 U.S.C. §§ 311–319, 37 C.F.R. § 42

TABLE OF CONTENTS

EXHIBITS

EX1001	U.S. Pat. No. 8,429,480 to Wang et al. ("the '480 patent")
EX1002	File History of the '480 Patent
EX1003	Declaration of Mr. Peter Rysavy
EX1004	Declaration of Mr. Craig Bishop
EX1005	China Academy of Telecommunications Technology (CATT), R2-074183, "Semi-Persistent Scheduling for UL VoIP in TDD," For Discussion and Decision at 3GPP TSG-RAN WG2 Meeting #59bis in Shanghai, China (October 8-12, 2007) ("CATT183")
EX1006	Nokia, R2-070476, "Uplink Scheduling for VoIP," For Discussion and Decision at 3GPP TSG-RAN WG2 Meeting #57 in St. Louis, Missouri (February 12-16, 2007) ("Nokia476")
EX1007	China Academy of Telecommunications Technology (CATT) and RITT, R2-070115, "Collision Avoidance While Using Synchronous HARQ," For Discussion at 3GPP TSG-RAN WG2 Meeting #56bis in Sorrento, Italy (November 15-19, 2007) ("CATT115")
EX1008	U.S. Patent Application Publication No. 2006/0256757 ("Kuusela")
EX1009	3GPP TS 36.300 v8.1.0, Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall Description Stage 2 (Release 8) ("TS_36_300")

EX1010	U.S. Patent Application Publication No. 2007/0177630 ("Ranta")
EX1011	*WSOU Investments, LLC v. Huawei Investment & Holding Co., Ltd.*, Case No. 6:20-cv-544, Original Complaint For Patent Infringement (W.D. Tex. June 17, 2020)
EX1012	LTE Overview, 3GPP, *available at* https://www.3gpp.org/technologies/keywords-acronyms/98-lte (accessed Nov. 7, 2020)
EX1013	3GPP TS 36.321 v1.0.0, Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); Medium Access Control (MAC) protocol specification (Release 8) ("TS_36_321")
EX1014	UTRA-UTRAN Long Term Evolution (LTE) and 3GPP System Architecture Evolution (SAE), *Long Term Evolution of the 3GPP Radio Technology, available at* ftp://ftp.3gpp.org/Inbox/2008_web_files/LTA_Paper.pdf (accessed Nov. 8, 2020)
EX1015	Puttonen et al., *Voice-over-IP Performance in UTRA Long Term Evolution Downlink* (May 2008)
EX1016	3GPP TS 36.211 v8.0.0, Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); Physical channels and modulation (Release 8) ("TS_36_211")
EX1017-1099	Reserved
EX1100	Complaints filed in *WSOU Investments LLC v. Huawei Technologies Co., Ltd., et al.*, Case Nos. 6:20-cv-00533-00544 (W.D. Tx.)

EX1101	Joint Motion to Enter Scheduling Order (Document 30), *WSOU Investments LLC v. Huawei Technologies Co., Ltd., et al.*, Case Nos. 6:20-cv-00533-00544 (W.D. Tx.)
EX1102	Huawei's Stipulation served in *WSOU Investments LLC v. Huawei Technologies Co., Ltd., et al.*, Case Nos. 6:20-cv-00533-00544 (W.D. Tx.)
EX1103	Order Setting Markman Hearing (Document 29), *WSOU Investments LLC v. Huawei Technologies Co., Ltd., et al.*, Case Nos. 6:20-cv-00536 (W.D. Tx.)
EX1104	Sample Order Governing Proceedings—Patent Cases (W.D. Tx.)
EX1105	November 2, 2020 Email from the Court re *WSOU Investments LLC v. Huawei Technologies Co., Ltd., et al.*, Case Nos. 6:20-cv-00533-00544 (W.D. Tx.)
EX1106	November 3, 2020 Email from the Court re *WSOU Investments LLC v. Huawei Technologies Co., Ltd., et al.*, Case Nos. 6:20-cv-00533-00544 (W.D. Tx.)

LISTING OF CLAIMS

Claim Element	Language
[1.P]	A method comprising:
[1.1]	detecting with a hybrid automatic repeat request function a collision between an uplink packet re-transmission and a new uplink packet transmission within a hybrid automatic repeat request process; and
[1.2]	in response, the hybrid automatic repeat request function dynamically allocating resources for transmitting the new uplink packet transmission in a different hybrid automatic repeat request process that does not collide with the uplink packet re-transmission.
[3]	The method according to claim 1, wherein the allocated resources are sent on a physical downlink control channel to a user equipment.
[4]	The method according to claim 1, wherein the method is executed by a network element.
[5.P]	A computer readable medium encoded with a computer program executable by a processor to perform actions comprising:
[5.1]	detecting with a hybrid automatic repeat request function a collision between an uplink packet re-transmission and a new uplink packet transmission within a hybrid automatic repeat request process; and
[5.2]	in response, the hybrid automatic repeat request function dynamically allocating resources for transmitting the new uplink packet transmission in a different hybrid automatic repeat request process that does not collide with the uplink packet re-transmission.

[6]	The computer readable medium encoded with a computer program according to claim 5, where resources are persistently allocated for transmitting the new uplink packet transmission in the different hybrid automatic repeat request process.
[7.P]	An apparatus comprising:
[7.1]	a hybrid automatic repeat request functional unit configured to detect with a hybrid automatic repeat request function, a collision between an uplink packet re-transmission and a new uplink packet transmission within a hybrid automatic repeat request process; and
[7.2]	in response, the hybrid automatic repeat request functional unit being configured to dynamically allocate resources for transmitting the new uplink packet transmission in a different hybrid automatic repeat request process that does not collide with the uplink packet re-transmission.
[8]	The apparatus according to claim 7, wherein the apparatus is embodied in a network element.
[9]	The apparatus according to claim 7, wherein resources are persistently allocated for transmitting the new uplink packet transmission in the different hybrid automatic repeat request process.
[10]	The apparatus according to claim 7, wherein the allocated resources are sent on a physical downlink control channel to a user equipment.
[11.P]	A method comprising:
[11.1]	transmitting a packet re-transmission in a hybrid automatic repeat request process using a semi-persistently scheduled uplink resource; and
[11.2]	responsive to receiving a dynamic allocation of a different hybrid automatic repeat request process, transmitting a new

	packet using the dynamically allocated different hybrid automatic repeat request process.
[12]	The method according to claim 11, further comprising persistently allocating a resource for transmitting the new packet transmission in the different hybrid automatic repeat request process.
[13]	The method according to claim 11, wherein the dynamic allocation of the different hybrid automatic repeat request process is received from a network element.
[14.P]	A computer readable medium encoded with a computer program executable by a processor to perform actions comprising:
[14.1]	transmitting a packet re-transmission in a hybrid automatic repeat request process using a semi-persistently scheduled uplink resource; and
[14.2]	responsive to receiving a dynamic allocation of a different hybrid automatic repeat request process, transmitting a new packet using the dynamically allocated different hybrid automatic repeat request process.
[15]	The computer readable medium encoded with a computer program of claim 14, where a resource is persistently allocated for transmitting the new packet transmission in the different hybrid automatic repeat request process.
[16]	The computer readable medium encoded with a computer program of claim 14, where the dynamic allocation of the different hybrid automatic repeat request process is received from a network element.
[17.P]	An apparatus comprising:
[17.1]	a hybrid automatic repeat request functional unit configured to transmit a packet re-transmission in a hybrid automatic repeat

	request process using a semi-persistently scheduled uplink resource; and
[17.2]	responsive to receiving a dynamic allocation of a different hybrid automatic repeat request process, the hybrid automatic repeat request functional unit configured to transmit a new packet using the dynamically allocated different hybrid automatic repeat request process.
[18]	The apparatus of claim 17, wherein the dynamic allocation comprises a resource is persistently allocated for transmitting the new packet transmission in the different hybrid automatic repeat request process.
[19]	The apparatus of claim 17, further comprising a receiver configured to receive the dynamic allocation of the different hybrid automatic repeat request process from a network element.
[20]	The apparatus of claim 17, wherein the apparatus is embodied in a user equipment.

I. INTRODUCTION

Huawei Technologies Co., Ltd. ("Huawei" or "Petitioner") requests *Inter Partes* Review ("IPR") of claims 1 and 3-20 ("the Challenged Claims") of U.S. Patent No. 8,429,480 ("the '480 patent").

II. MANDATORY NOTICES UNDER 37 C.F.R § 42.8(a)(1)

A. Real Parties-In-Interest Under 37 C.F.R. § 42.8(b)(1)

Huawei Technologies Co., Ltd.; Huawei Device USA, Inc.; Huawei Technologies USA Inc.; Huawei Investment & Holding Co., Ltd.; Huawei Device (Shenzhen) Co., Ltd.; Huawei Device Co., Ltd.; Huawei Tech. Investment Co., Ltd.; and Huawei Device (Hong Kong) Co., Ltd. are the real parties-in-interest. No other parties had access to or control over this Petition, and no other parties funded this Petition.

B. Related Matters Under 37 C.F.R. § 42.8(b)(2)

WSOU Investments, LLC d/b/a/ Brazos Licensing and Development ("WSOU" or "Patent Owner")—the alleged Patent Owner—filed a complaint against Petitioner asserting the '480 patent on June 17, 2020 in the U.S. District Court for the Western District of Texas (Case No. 6:20-cv-00544). This complaint was one of twelve patent lawsuits filed by Patent Owner against Petitioner on the same date:

Asserted Patent No.	Civil Case No. (W.D. Tex.)
6,882,627	6-20-Cv-00533
7,095,713	6-20-Cv-00534
7,508,755	6-20-Cv-00535
7,515,546	6-20-cv-00536
7,860,512	6-20-cv-00537
7,872,973	6-20-cv-00538
8,200,224	6-20-cv-00539
8,417,112	6-20-cv-00540
9,084,199	6-20-cv-00541
8,249,446	6-20-cv-00542
6,999,727	6-20-cv-00543
8,429,480	6-20-cv-00544

None of the twelve asserted patents are related to the ’480 patent as a continuation/divisional. Petitioner is not aware of any disclaimers or reexamination certificates addressing the ’480 patent.

C. Lead And Back-Up Counsel Under 37 C.F.R. § 42.8(b)(3)

Petitioner provides the following designation of counsel.

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D. Service Information

Please address all correspondence and service to the address listed above. Petitioner consents to electronic service by email at IPR35548-0130IP1@fr.com (referencing No. 35548-0130IP1 and cc'ing PTABInbound@fr.com and hawkins@fr.com).

III. PAYMENT OF FEES – 37 C.F.R. § 42.103

The Patent and Trademark Office is authorized to charge Deposit Account No. 06-1050 for the fee set in 37 C.F.R. § 42.15(a) for this Petition and any additional fees.

IV. REQUIREMENTS FOR IPR UNDER 37 C.F.R. § 42.104

A. Grounds For Standing Under 37 C.F.R. § 42.104(a)

Petitioner certifies that the '480 patent is available for IPR, and Petitioner is not barred or estopped from requesting IPR.

B. Challenge Under 37 C.F.R. § 42.104(b) and Relief Requested

Petitioner requests IPR of the Challenged Claims on the grounds listed below. The expert declaration of Mr. Peter Rysavy (EX1003) also supports this Petition.

Ground	Claims	§103 Combination
1A	11-13	CATT183-Nokia476
1B	14-16	CATT183-Nokia476-Ranta
1C	17-20	CATT183-Nokia476-TS_36_300
1D	1, 3-4, 7-10	CATT183-Nokia476- TS_36_300-CATT115
1E	5-6	CATT183-Nokia476-TS_36_300-CATT115-Ranta
2A	1, 4, 7-9	CATT115-Kuusela-TS_36_300
2B	3, 10	CATT115-Kuusela-TS_36_300-Nokia476
2C	5-6	CATT115-Kuusela-TS_36_300-Ranta
2D	11, 13-14, 16	CATT115-Kuusela-Nokia476
2E	12, 15, 17-20	CATT115-Kuusela-Nokia476-TS_36_300

The ’480 patent was filed as a U.S. national stage entry from a PCT application filed September 30, 2008, and claims priority to a provisional application filed October 5, 2007. Petitioner treats October 5, 2007 as the Critical Date for evaluating prior art status:

Reference	Filing	Publication	Status
CATT183	---	10/02/2007	§102(a)
Nokia476	---	02/09/2007	§102(a)
TS_36_300	---	07/03/2007	§102(a)
Ranta	11/29/2006	08/02/2007	§§102(a), (e)
CATT115	---	01/10/2007	§102(a)
Kuusela	04/25/2006	11/16/2006	§§102(a), (e)

Nokia476 was cited during prosecution, and both Nokia476 and TS_36_300 are referenced in the specification of the '480 patent. CATT183, Kuusela, Ranta, and CATT115 were neither cited nor referenced in the specification. None of the prior art in Grounds 1(A)-2(E) were used to reject the claims during prosecution.

CATT183, Nokia476, and CATT115 are technical documents ("TDocs," also referred to as "contributions") submitted to the RAN2 working group of 3GPP, which is the standards body that developed and maintains LTE and other wireless communications standards. EX1004, §II. TS_36_300 is a technical specification published by 3GPP pertaining to LTE E-UTRA/E-UTRAN. *Id.* According to standard 3GPP practices, TDocs were made available to the public without restriction when uploaded to a public file server that attached a timestamp to the date/time of the submission. *Id.* 3GPP members also commonly distributed TDocs via an email exploder to subscribers of pertinent 3GPP distribution lists in the relevant timeframe (e.g., October 5, 2007). *Id.* 3GPP standards were widely adopted around the world,

and interest from industry, academia, and other members of the public meant that ordinarily interested persons knew how to freely access 3GPP documents from the public file server and email exploder. Additionally, Technical Specifications Groups typically held quarterly plenary meetings to discuss member contributions and other matters. TDocs were discussed at these meetings, and a record of participation and discussion items were recorded in meeting minutes. *Id.*

Mr. Bishop has substantial experience over many years working with 3GPP to develop wireless standards, including in the relevant timeframe (Oct. 5, 2007). *Id.*, §1. Mr. Bishop reviewed publicly available documentation from the 3GPP web-site and elsewhere (as reflected in Appendices C-S (EX1004)), and determined the following:

- CATT183 was made publicly accessible via the 3GPP public file server and email exploder on October 2, 2007. EX1004, §III.

- Nokia476 was made publicly accessible via the 3GPP public file server and email exploder on February 9, 2007, and was actually disseminated and discussed at a plenary meeting by February 16, 2007. EX1004, §IV.

- CATT115 was made publicly accessible via the 3GPP public file server on January 12, 2007, and was publicly distributed via the email exploder on January 10, 2007. CATT115 also would have been actually disseminated and discussed at a

plenary meeting by January 19, 2007. EX1004, §V.

- TS_36_300 was made publicly accessible via the 3GPP public file server on July 3, 2007, and interested persons would have received notice of its forthcoming availability through an email distributed on the email exploder attaching meeting minutes of TSG RAN #36 on June 12, 2007. EX1004, §VI.

The evidence here thus confirms that CATT183, Nokia476, CATT115, and TS_36_300 qualify as printed publications as required by 35 U.S.C. §311(b). *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29 (PTAB Dec. 20, 2019) (precedential).

V. Summary Of The ’480 Patent

A. Brief Description

The ’480 patent relates to wireless communication systems, and specifically describes techniques in the context of an “evolved UTRAN” or “LTE” system. EX1001, 1:13-19, 1:58-63. Mr. Rysavy provides a detailed technical overview of concepts relevant to the technologies described and claimed in the ’480 patent. EX1003, §VI.A.

In particular, the ’480 patent focuses on the problem of collisions that can occur between uplink transmissions (from a wireless unit (“UE”) to a base station (“eNB”)) when (i) persistent (or semi-persistent) scheduling provides a new VoIP

packet for transmission during a particular uplink subframe and (ii) a synchronous HARQ process provides a previous VoIP packet for retransmission from the same UE during the same uplink subframe. EX1001, FIG. 2; EX1003, ¶¶32-33. To address this problem, the '480 patent proposed techniques for "performing UE [] specific load balancing among HARQ processes, in particular for the case of semi-persistent scheduling the LTE TDD UL." EX1001, 6:30-35. "More specifically, when a new transmission packet and re-transmission packet from one UE … occur within one HARQ process, the re-transmission packet is transmitted during the time at which a collision would occur, and the new transmission packet is dynamically scheduled to a new resource in another, different HARQ process." *Id.*, 6:38-43. Figure 3 shows one example of these techniques:

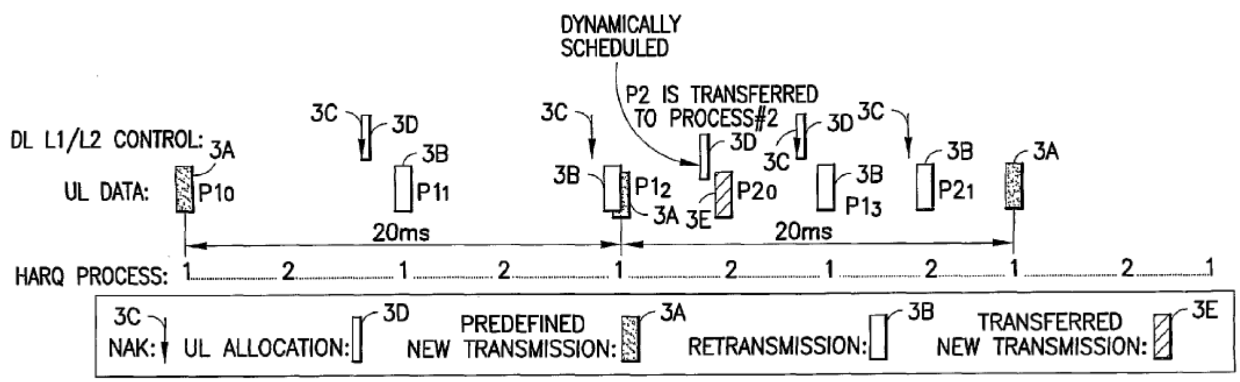


FIG.3

EX1001, FIG. 3.

B. Summary of the Prosecution History Of The '480 Patent

The '480 patent was filed April 5, 2010 as a national stage entry from a PCT

application filed September 20, 2008, and claiming priority to a provisional application filed October 5, 2007. EX1001; EX1002, 97-151; EX1003, ¶34. In the only Office Action mailed in the course of prosecution of the '480 patent, the Examiner rejected various claims as indefinite under 35 U.S.C. §112, ¶2. EX1002, 30-34. The Examiner raised no prior art rejections, and the claims were otherwise identified as reciting allowable subject matter. *Id.*, 33. In response to this office action, the applicant corrected certain formalities and amended the claims based on the Examiner's suggestions to overcome the rejections under §112, ¶2. *Id.*, 20-26. The Examiner thereafter mailed a Notice of Allowance, although the Notice provided no explicit reasons for allowance. *Id.*, 9-13.

VI. Level of Ordinary Skill

A person of ordinary skill in the art at the time of the '480 patent (a "POSITA") would have had at least a Master's degree in computer science, computer engineering, electrical engineering, or a related field, with 3-5 years of experience in wireless communication systems. EX1003, ¶18. Such experience could be obtained through research and study in a graduate program or through comparable exposure to research literature through industry employment working in the field of wireless communication systems, and additional years of experience could substitute for the advanced-level degree. *Id.*

VII. Claim Construction Under 37 C.F.R. §§ 42.104(b)(3)

All claim terms should be construed according to the *Phillips* standard. *Phillips v. AWH Corp*., 415 F.3d 1303 (Fed. Cir. 2005); 37 C.F.R. § 42.100. In the Related Litigation, a *Markman* hearing is scheduled for April 2021. EX1103. Here, there are no instances of lexicography in the '480 patent, and no party has alleged instances of unique, specialized terms in the claims requiring a departure from the plain and ordinary meaning of the claim language. The Board has repeatedly explained that "claim terms need only be construed to the extent necessary to resolve the controversy," and for purposes of the particular Grounds 1(A)-2(E) in this Petition, no formal construction is necessary. *Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011).

VIII. [GROUND 1A] – Obviousness Based On CATT183-Nokia476 (Claims 11-13)

A. Overview Of CATT183

Like the '480 patent, CATT183 recognized the problem of conflicts arising between re-transmissions in synchronous HARQ and initial transmissions in semi-persistently scheduled initial packet transmissions. EX1005, 1; EX1003, ¶¶36-38.

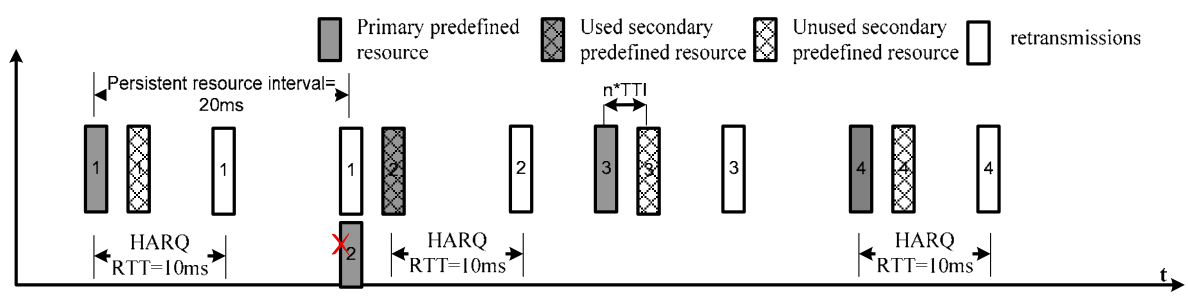
CATT183 describes a solution to this problem that involves diverting the initial transmission of a new packet to a different HARQ process if there is a conflict with a retransmission in a first HARQ process. EX1005, 2-3 ("Alt 2"). CATT 183

described this technique as follows:

> Allocate two persistent resources to voice packet in adjacent uplink subframes, named "primary predefined resource" and "secondary predefined resource". The interval between them is n*TTI, where n≥1 and n will be small so that the packet can be transmitted quickly. If there is the 2nd retransmission of the last voice packet use the primary predefined resource, then the initial transmission of the current voice packet will use the secondary predefined resource. Otherwise, the initial transmission will use the primary predefined resource, and the secondary predefined resource can be dynamically scheduled to other service.

EX1005, 3.

Figure 3 of CATT183 illustrates the proposed "Alt 2" solution:



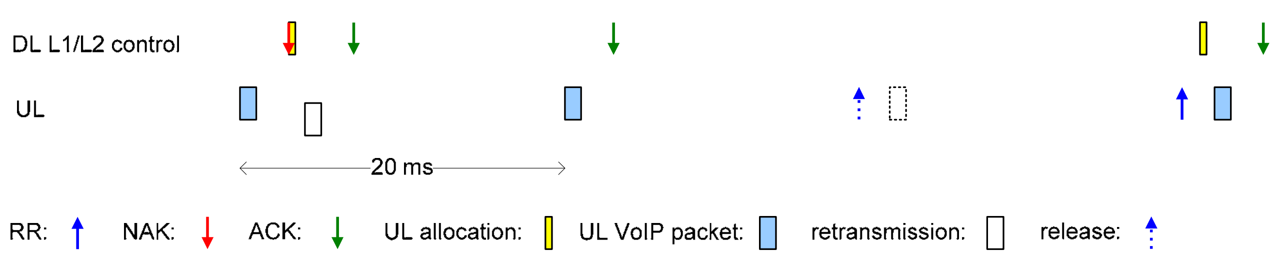
EX1005, FIG. 3 (p. 3).

B. Overview Of Nokia476

Nokia476 describes several scheduling alternatives for uplink VoIP in LTE

systems. EX1006, 1; *generally id.*, 1-5; EX1003, ¶¶39-40. The disclosed alternatives include fully dynamic scheduling, fully persistent scheduling, and semi-persistent scheduling. *Id.*; *supra*, Section V.A (providing overview of each scheme).

The '480 patent's background discussion acknowledges that "[s]emi-persistent scheduling has [] been agreed to for use in LTE, wherein initial/new transmissions of voice packets are persistently allocated (a set of resources in every 20 ms are predefined) and re-transmissions of packets are dynamically scheduled by Layer 1/Layer 2 signaling." EX1001, 2:27-32. Nokia476 provides additional detail regarding semi-persistent scheduling, and further discloses ordinary signaling exchanges that occur between a UE and eNB in an E-UTRAN (LTE) system to acknowledge successful/unsuccessful receipt of uplink transmissions and to dynamically allocate or schedule resources to the UE for upcoming transmissions. EX1006, 1-5. Figure 3, for example, depicts an example signaling exchange in the context of semi-persistent scheduling:



EX1006, FIG. 3 (p. 3).

C. Predictable Combination Of CATT183-Nokia476

The teachings of CATT183 and Nokia476 would have been predictable to combine according to both of the alternative implementations described below in §§VIII.C.1 and VIII.C.2, and would have rendered claims 11-13 of the '480 patent obvious. EX1003, ¶35, §IX. Further, both of the alternative combinations would have provided each element of claims 11-13 as described below in §VIII.C.3. *Id.*, ¶¶50-63.

1. Overview Of First Alternative Combination

As described above (§VIII.A), CATT183 discloses techniques in E-UTRAN for resolving collisions between retransmission of a first voice packet and initial transmission of a second voice packet on a single UE by directing them to different predefined persistent resources. EX1005, 2-3; EX1003, ¶¶50-59. Specifically, in the event of a scheduled collision, the UE (i) retransmits the first packet using the same persistent resource that was used for the initial/prior transmissions of the first packet (e.g., the first predefined resource) and (ii) transmits the second packet using the other persistent resource (e.g., the secondary predefined resource). EX1005, 2-3. The initial transmission of the second packet thus diverts to a different HARQ process from the first process associated with transmissions of the first packet. *Id.*, FIG. 3; EX1003, ¶50.

Although the secondary resource in CATT183 is predefined even before a scheduled collision is identified, a POSITA would have understood that the secondary resource can alternatively be allocated according to other well-known techniques. EX1003, ¶51. For example, Nokia476 describes a range of scheduling techniques including "dynamic" scheduling and "persistent" scheduling (both "fully"-persistent and "semi"-persistent scheduling). EX1006, 1-4; *supra*, §VIII.B. According to the teachings of Nokia476, CATT183's proposal for persistent scheduling of the secondary resource suggests that the secondary resource would be available to the UE on a regular basis—even before a specific collision is identified between retransmission of one packet and initial transmission of another. EX1006, §2.2; EX1003, ¶51.

Although persistent scheduling reduces control signaling overhead between the UE and eNB, Nokia476 explains that dynamic scheduling typically offers greater scheduling flexibility and results in more efficient resource allocation. EX1006, §2.1 (pp. 1-2) ("[d]ynamic scheduling … is naturally most flexible from the scheduling and UL resource usage point of view"). For the reasons explained in following paragraphs, it would have been obvious to modify CATT183's "Alt 2" solution according to Nokia476's suggestion for dynamic scheduling such that the secondary resource is *dynamically* scheduled (rather than *persistently* scheduled as described

in CATT183). EX1003, ¶¶52-53. In particular, a predictable application of dynamic scheduling based on Nokia476 to the CATT183 system would have resulted in a system that dynamically allocates the secondary resource to the UE only when needed to provide additional uplink capacity necessary to resolve a scheduled collision between a HARQ retransmission and an initial transmission of a next voice packet from a UE. *Id.*

Multiple reasons would have prompted a POSITA to combine the teachings of CATT183 and Nokia476 to provide for dynamic scheduling rather than predefined persistent scheduling of the secondary resource. EX1003, ¶54.

First, dynamically scheduling the secondary resource would have provided more efficient resource usage since the secondary resource would be allocated only when actually needed to resolve a conflict between a pair of transmissions from a UE during a particular TTI. EX1003, ¶55; EX1006, §2.1 ("[d]ynamic scheduling … is naturally most flexible from the scheduling and UL resource usage point of view"). A POSITA would have appreciated that dynamic scheduling ordinarily reduces wasted resources that would arise if a UE were allocated a resource in advance before determining that the resource is actually needed. EX1003, ¶55. When there is no collision, dynamic scheduling ensures that the resource would not be pre-allocated to the UE to address a non-existent conflict. The resource can then be assigned

to other UEs, for example—thereby increasing performance of the system as a whole (especially when resources are scarce). EX1003, ¶56; EX1006, §§2.1, 2.3 (describing benefits of freeing resources for other users). And while CATT183 acknowledges that the predefined secondary resource can be "dynamically scheduled to other service" when it is not needed, a POSITA would have seen benefits in implementing dynamic scheduling of the secondary resource in the first instance to maximize availability of the resource to other UEs. EX1003, ¶56. Dynamic scheduling in this manner would thus mitigate much of the "complexity" of the Alt 2 scheme. EX1003, ¶56; EX1005 ("Alt 2 … implementation complexity will be increased").

Second, dynamically scheduling the secondary resource would have enabled the system to realize certain other well-known benefits associated with dynamic scheduling as discussed in Nokia476. EX1003, ¶57. For example, Nokia476 lists several advantages stemming from dynamic scheduling including "[f]lexible scheduling of VoIP and other users," "[s]cheduling freedom," "[f]requency and time selective scheduling," and "[f]ast and slow link adaptation." EX1006, §2.1 (pp. 1-2).

Third, implementing CATT183 according to Nokia476's suggestion for dynamic scheduling would have involved the mere application of a known technique (Nokia 476's dynamic scheduling) to a known system (CATT183) to yield predictable results with high expectation of success. EX1003, ¶58; *KSR Int'l Co. v. Teleflex*

Inc., 550 U.S. 398, 417 (2007). Indeed, CATT183 already acknowledges the feasibility of dynamic resource allocation when there is no collision and Nokia476 provides additional detail regarding this predictable approach. EX1003, ¶58.

Fourth, a POSITA would have found Nokia 476's suggestion for dynamic scheduling obvious to try in the context of CATT183 (e.g., such that the system dynamically allocates the secondary resource upon identifying a scheduled collision). Indeed, E-UTRAN broadly provides a finite set of options—just two options—for allocating resources to an uplink transmission: either (1) pre-allocate the resource ahead of time or (2) dynamically allocate the resource on an as-needed basis. EX1003, ¶59. Given these two known and finite options, it would have been obvious to try dynamic allocation in CATT183 to achieve the predictable benefits associated with such an approach as described above. EX1006, §2.1; *see also id.*, §2.3; EX1003, ¶59; *Uber Techs., Inc. v. X One, Inc.*, 957 F.3d 1334, 1340 (Fed. Cir. 2020) ("where an 'ordinary artisan would . . . be left with two design choices . . .[e]ach of these two design choices is an obvious combination") (quoting *ACCO Brands Corp. v. Fellowes, Inc.*, 813 F.3d 1361, 1367 (Fed. Cir. 2016)).

2. Overview Of Second Alternative Combination

While the first alternative combination described in §VIII.C.1 involved modifying CATT183 so that the secondary resource is ordinarily allocated dynamically

(without predefining the secondary resource before identifying a collision), the evidence here confirms that it further would have been predictable to implement CATT183 according to Nokia476's suggestion for dynamic resource allocation in a second alternative manner that maintains CATT183's *predefined* secondary resource. EX1003, ¶¶60-63; EX1005, 2-3 (Alt 2 solution).

Specifically, CATT183 proposed to "[a]llocate two persistent resources to voice packet in adjacent uplink subframes, named 'primary predefined resource' and 'secondary predefined resource.'" EX1005, §2.2 ("Alt 2"). However, CATT183 also acknowledges that when there is no second retransmission of a first voice packet that would collide with the initial transmission of a second voice packet, then the "initial transmission [of the second voice packet] will use the primary predefined resource, ***and the secondary predefined resource can be dynamically scheduled to other service***." *Id.* (emphasis added). CATT183's proposal to re-allocate the secondary resource to other services is consistent with the well-understood practice in E-UTRAN of dynamically allocating unused resources to other services or other users (e.g., as confirmed by Nokia476's description of semi-persistent scheduling).[1]

[1] Notably, CATT183 does not mandate that the secondary predefined resource *always* be dynamically re-allocated to another service when there is no collision,

EX1006, §2.3 ("released resource can be allocated to some other VoIP user"); EX1003, ¶61.

CATT183 does not expressly disclose what happens to the secondary predefined resource *after* being dynamically re-scheduled to another service. Still, the possibility of collisions arising between future transmissions remains, and a POSITA would have appreciated that a secondary resource would still benefit the UE to address future collisions. EX1003, ¶62. One predictable solution for re-allocating a secondary resource to the UE in this situation would have entailed, after its initial release, dynamically re-allocating a secondary resource to the UE based on the teachings of Nokia476. EX1003, ¶62; *see also supra*, §VIII.C.1.

A POSITA would have been motivated to re-allocate CATT183's secondary resource using dynamic allocation techniques based on Nokia476 for substantially

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only that it "can be" dynamically rescheduled. EX1005, 3. Indeed, FIG. 3 shows instances where the unused secondary predefined resource is not re-allocated. *Id.* Whether dynamic re-allocation occurs in a given circumstance may depend on various factors including current system conditions and/or preferences of the system designer.

the same reasons that dynamic allocation was obvious to apply in the First Alternative combination. EX1003, ¶63; *supra*, §VIII.C.1. For example, by dynamically reallocating a secondary resource to a UE after the secondary resource was previously released in response to identifying a scheduled collision, the likelihood of the secondary resource being wasted/unused will ordinarily diminish (leading to more efficient resource usage). EX1003, ¶63. Dynamic allocation was also associated with other well-known benefits as disclosed in Nokia476 including "[f]lexible scheduling," "[f]requency and time selective scheduling," and "[f]ast and slow link adaptation." EX1006, §2.1; EX1003, ¶63. Further, as described above (§VIII.C.1), dynamic resource allocation would have achieved predictable results and would have been obvious to try, especially where the '480 patent's background discussion admits that dynamic resource allocation was already known to address collisions. EX1001, 2:27-32; EX1003, ¶63.

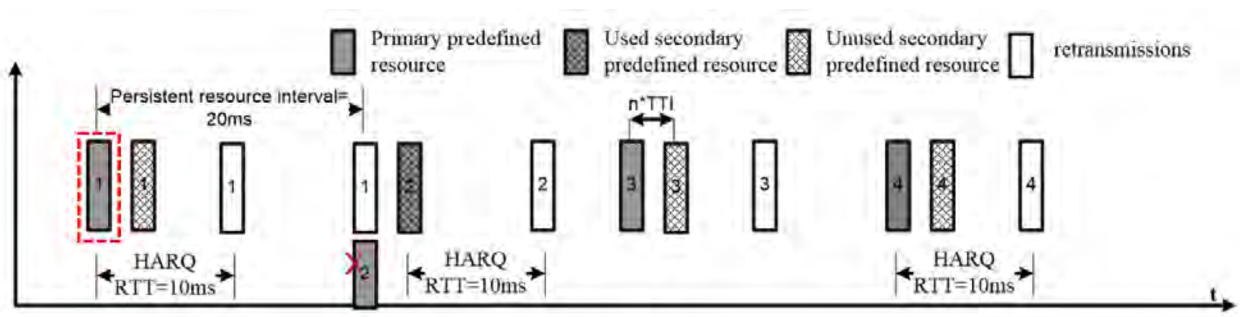
3. Claim Element Analyses

Element [11.P]

To the extent the preamble is limiting, CATT183 discloses in §2.2 (Alt 2) a method for collision resolution, and the First and Second Alternative CATT183-Nokia476 combinations described above provide the recited method. EX1005, 2-3; *supra*, §VIII.C.1-2; EX1003, ¶64.

Element [11.1]

CATT183 discloses transmitting a packet re-transmission in a first HARQ process using a persistently scheduled "primary" predefined uplink resource. EX1005, §2.2 (Alt 2).



EX1005, FIG. 1.

CATT183 also acknowledges that "semi-persistent scheduling has been adopted for VoIP" in E-UTRAN. *Id.*, §1. To the extent CATT183 does not expressly disclose that the primary resource in the "Alt 2" embodiment is "semi-persistently" scheduled, this feature was well known before the earliest possible priority date of the '480 patent (October 5, 2007) and would have been obvious to apply to scheduling the primary resource in the resulting CATT183-Nokia476 combinations. EX1003, ¶¶65-68.

For example, Nokia476 explains that semi-persistent scheduling involves automatic release of persistently scheduled resources, e.g., during "silence periods" of

a voice session. EX1006, §2.3. It would have been obvious to implement the resulting First and Second alternative combinations according to Nokia476's suggestion for semi-persistent scheduling such that the primary resource would be semi-persistently scheduled. EX1003, ¶67.

A POSITA would have sought to implement semi-persistent scheduling in this manner for several reasons. EX1003, ¶68.

First, releasing the primary resource during silence periods would have advantageously allowed for more efficient resource usage because it would then be available to re-allocate to other users. EX1003, ¶.

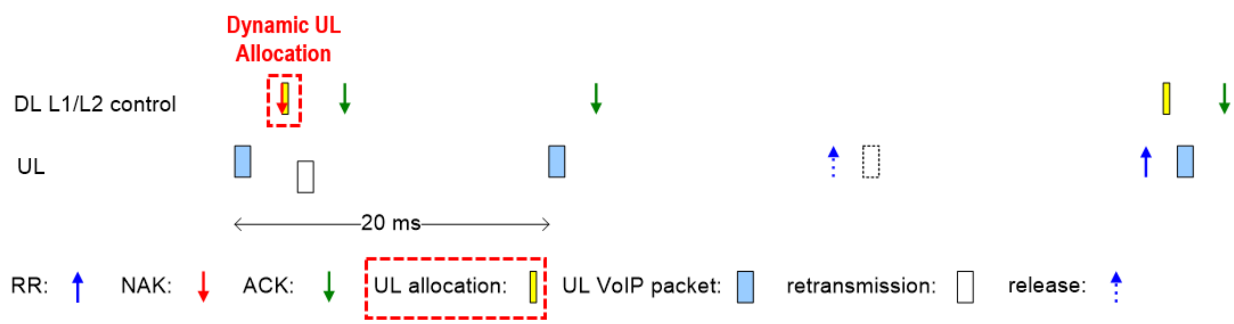
Second, semi-persistent scheduling was already commonly agreed upon in E-UTRAN (as admitted by CATT183), and it would have been predictable to adopt in the system in light of this agreement for purposes of achieving uniformity. *Id.*, ¶68.

Third, the resulting combination would have achieved desired results consistent with the expected operation of semi-persistent scheduling as described in Nokia476. EX1003, ¶68.

Element [11.2]

CATT183 describes operations for predefining a secondary resource for a second (different) HARQ process to carry new packet transmissions in the event of a scheduled collision. EX1005, §2.2 (Alt 2).

To the extent CATT183 does not expressly disclose receiving a dynamic allocation of the second (different) HARQ process, the First and Second Alternative CATT183-Nokia476 combinations would have achieved this feature based on Nokia476's suggestions for dynamic resource allocation.[2] EX1003, ¶¶69-71. Nokia 476 confirms that dynamic resource allocation was well-known in the context of semi-persistent scheduling. EX1006, §2.3. For instance, Figure 3 of Nokia476 shows the UE receiving a dynamically allocated uplink resource for retransmission of a packet that was not successfully received at the eNB:

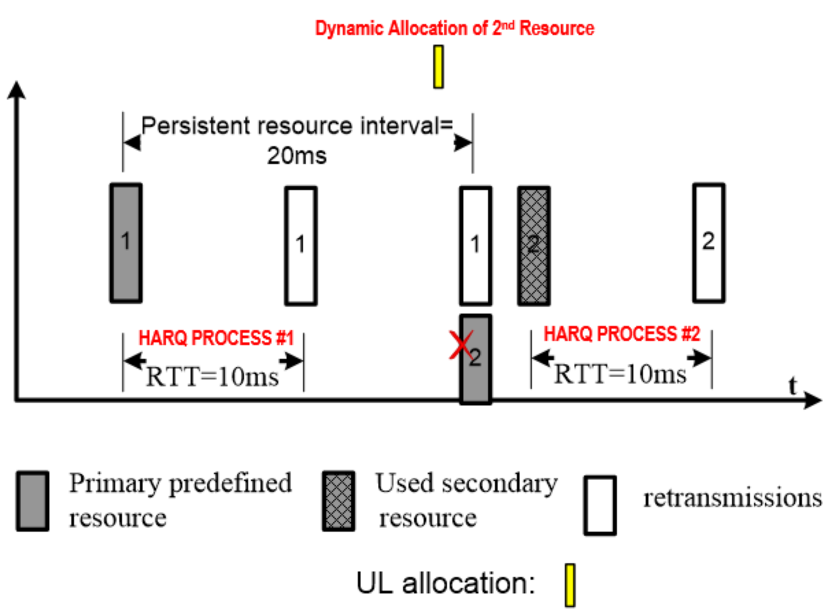


[2] For purposes of mapping prior art, this Petition treats "receiving a dynamic allocation of a different [HARQ] process," as recited in Element [11.2], as encompassing receipt of dynamically allocated resources for transmitting in a different HARQ process. *See, e.g.*, EX1001, 3:3-5, FIG. 7; Element [1.2]. Petitioner does not waive any defenses under 35 U.S.C. §112 with respect to Element [11.2] that may be raised in other forums.

EX1006, FIG. 3 (annotated).

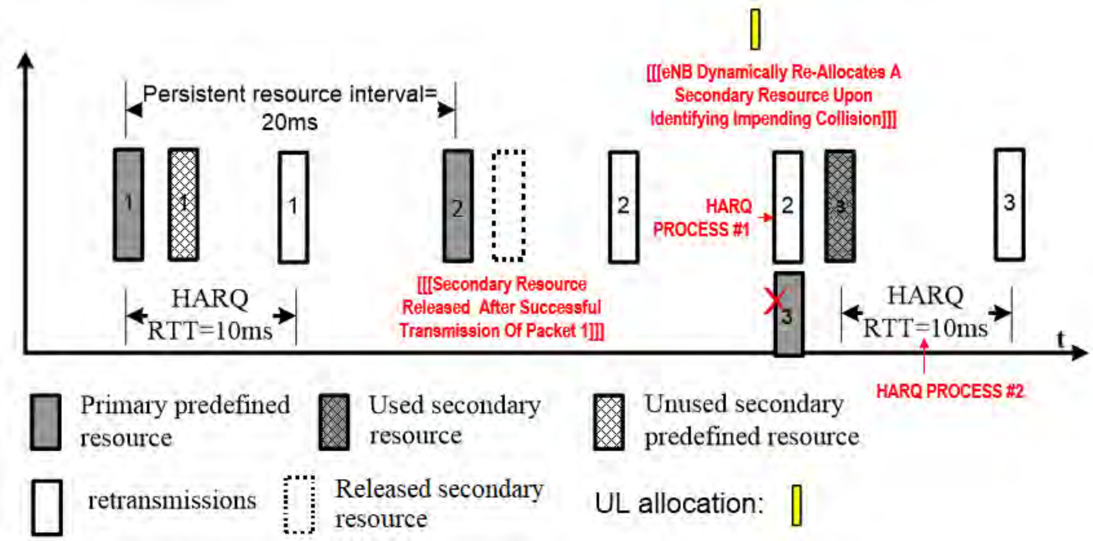
For the reasons explained in detail above (§§VIII.C.1-2), it would have been obvious to implement CATT183's Alt 2 embodiment according to the teachings of Nokia476 for dynamic resource allocation. EX1003, §§IX.A-B, ¶71. In both the First and Second Alternatives CATT183-Nokia476 combinations, a UE in the resulting system predictably receives a dynamic allocation of the secondary resource for a second (different) HARQ process, and in response, transmits a new packet using the dynamically allocated secondary resource in the different HARQ process in a different subframe. EX1003, ¶71.

First Alternative Combination:



EX1003, ¶71.

Second Alternative Combination



EX1003, ¶71.

Element [12]

The teachings of CATT183-Nokia476 provide the feature recited in this claim element in at least two ways. EX1003, ¶¶72-74.

First, in the Second Alternative CATT183-Nokia476 combination described above (§VIII.C.2), the secondary resource (corresponding to the recited "persistently allocat[ed] … resource") is predefined and persistently scheduled before being dynamically rescheduled to another user/service. EX1003, ¶73. The secondary resource in this instance is predefined and persistently scheduled, and is specifically provided for transmitting a new packet transmission in the second (different) HARQ

process.[3] EX1005, §2.2 (Alt 2), FIG. 3.

Second, CATT183 explains how "E-UTRAN allocates predefined resources for the first HARQ transmissions ***and potentially retransmissions to UEs***." EX1005, §1 (emphasis added). CATT183 thus confirms that capabilities for predefining not just the initial transmission in a HARQ process but also retransmissions were known—and indeed were actively explored for the E-UTRAN standard at the time of the earliest possible priority date of the '480 patent (October 5, 2007). EX1003, ¶74; *see also* EX1009, §11.1.2. By predefining a resource for both the initial transmission and retransmissions, the resource is "persistently" allocated within the meaning of that term as used in the '480 patent—e.g., since retransmissions do not need to be individually scheduled on a dynamic basis. EX1003, ¶74. Regardless whether the resource persists for transmissions of subsequent packets, the '480 patent provides that a resource can be "persistently" allocated even if the resource persists only for transmissions of a single packet. *See* EX1001, 7:7-11

[3] Petitioner notes claim 12 lacks antecedent basis for "the new packet transmission," and does not require that that the transmission occur in a dynamically allocated HARQ process.

("[O]nly a new transmission that has collided with a re-transmissions need by dynamically scheduled to another HARQ process, as other new transmissions can occur in the persistent fashion in process #1 if the loading in HARQ process #1 is reasonable."), 7:65-67, 8:14-17, 8:33-36. According to the teaching of CATT183, the secondary resource in both the First and Second Alternative CATT183-Nokia476 combinations would thus be persistently allocated for transmitting the new packet transmission in the second (different) HARQ process. EX1003, ¶74.

Element [13]

Nokia476 discloses that the UE receives dynamically allocated resources from the Node B (e.g., eNB). EX1006, FIG. 3 (showing dynamic uplink resource allocation provided with NACK), ("allocation is sent either on L1/L2 control channel"); *generally* §§2.1, 2.3. As explained in detail above (§§VIII.C.1-2), the UE in the predictable First and Second Alternative CATT183-Nokia476-CATT115 combinations receives the dynamic allocation of the second (different) HARQ process from the eNB (corresponding to the recited "network element"). EX1003, ¶75; *cf* EX1001, 8:29-32, FIG. 8 (receiving dynamic allocation from eNB in '480 patent); *supra*, §V.A.

IX. [GROUND 1B] – Obviousness Based On CATT183-Nokia476-Ranta (Claims 14-16)

A. Overview Of Ranta

Ranta discloses "wireless communications systems and, more specifically, … techniques that provide for a retransmission of data." EX1010, [0002]; EX1003, ¶¶41-42. Ranta's techniques are applicable to wireless systems including LTE and E-UTRAN. EX1010, [0047] ("By way of introduction, in current standardization efforts, such as those for a proposed 3GPP UTRA and UTRAN long term evolution (LTE) network, it may be useful to employ HARQ."), [0104]-[0107].

Ranta further describes components of wireless systems such as LTE. EX1010, [0052]-[0055], FIG. 1; *see also id.*, [0121]-[0125]. For instance, Figure 1 depicts "a wireless network 1 [] adapted for communication with a UE 10 via a base station (e.g., Node B or BTS) 12." *Id.*, [0052].

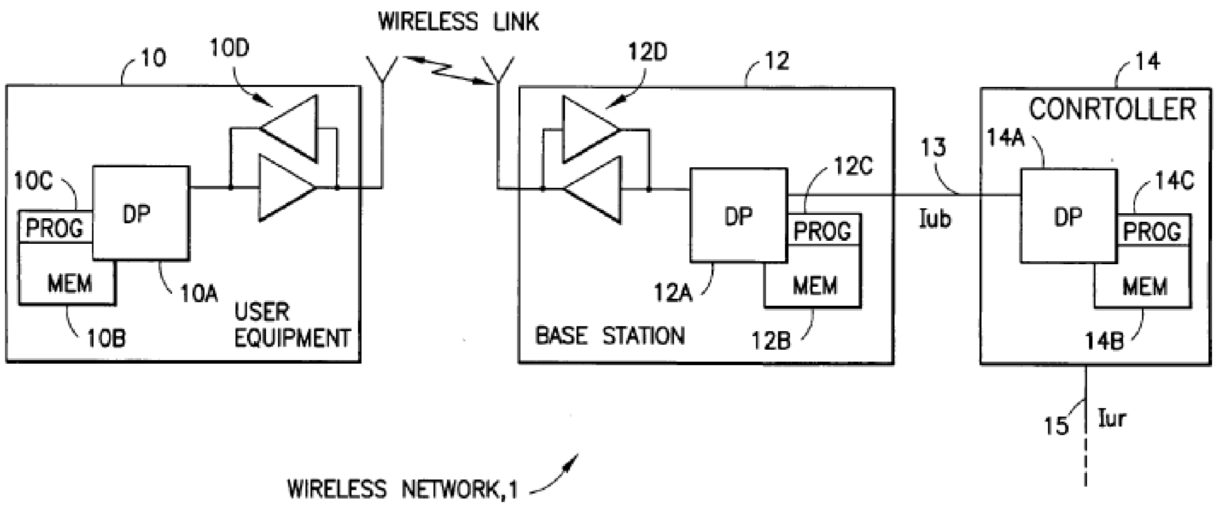


FIG.1

EX1010, FIG. 1.

B. Predictable Combination Of CATT183-Nokia476-CATT115-Ranta

Element [14.P]

The First and Second Alternative CATT183-Nokia476 combinations described above provide predictable techniques for resolving collisions in E-UTRAN. *Supra*, §§VIII.C.1-2. To the extent the preamble is a limitation, and to the extent CATT183 and Nokia476 do not expressly disclose the recited "computer readable medium," this feature would have been obvious in view of Ranta. EX1003, ¶¶76-77. For example, Ranta discloses a "UE 10 [that] includes a data processor (DP) 10A, a memory (MEM) 10B that stores a program (PROG) 10C …" EX1010, [0052]; *see also* [0053]-[0055], FIG. 1. Ranta also discloses the UE can include "a

computer program product … that tangibly embodies a program of machine-readable instructions executable by a digital processing apparatus to perform operations." *Id.*, [0035], [0038], claims 17, 34.

It would have been obvious to further modify the First and Second Alternative CATT183-Nokia476 combinations according to Ranta's suggestions here such that the UE would include a computer-readable medium encoded with a computer program executable by a processor to perform the actions of the UE described above in §§VIII.C.1-2. Multiple reasons would have motivated a POSITA to implement the combination. EX1003, ¶77. For example, the computer-readable medium would have enabled the UE to execute actions for collision resolution and thereby achieve well-known benefits (e.g., more reliable delivery of packet transmissions and more efficient use of uplink resources). EX1003, ¶77. It also would have been predictable and natural to implement a computer-readable medium encoded with a computer program product as claimed since UEs ordinarily included computer-readable mediums of this type as of the earliest possible priority date of the '480 patent. EX1003, ¶77.

Element [14.1]

Supra, §VIII.C.3, Element [11.1]; EX1003, ¶78.

Element [14.2]

Supra, §VIII.C.3, Element [11.2]; EX1003, ¶79.

Element [15]

Supra, §VIII.C.3, Element [12]; EX1003, ¶80.

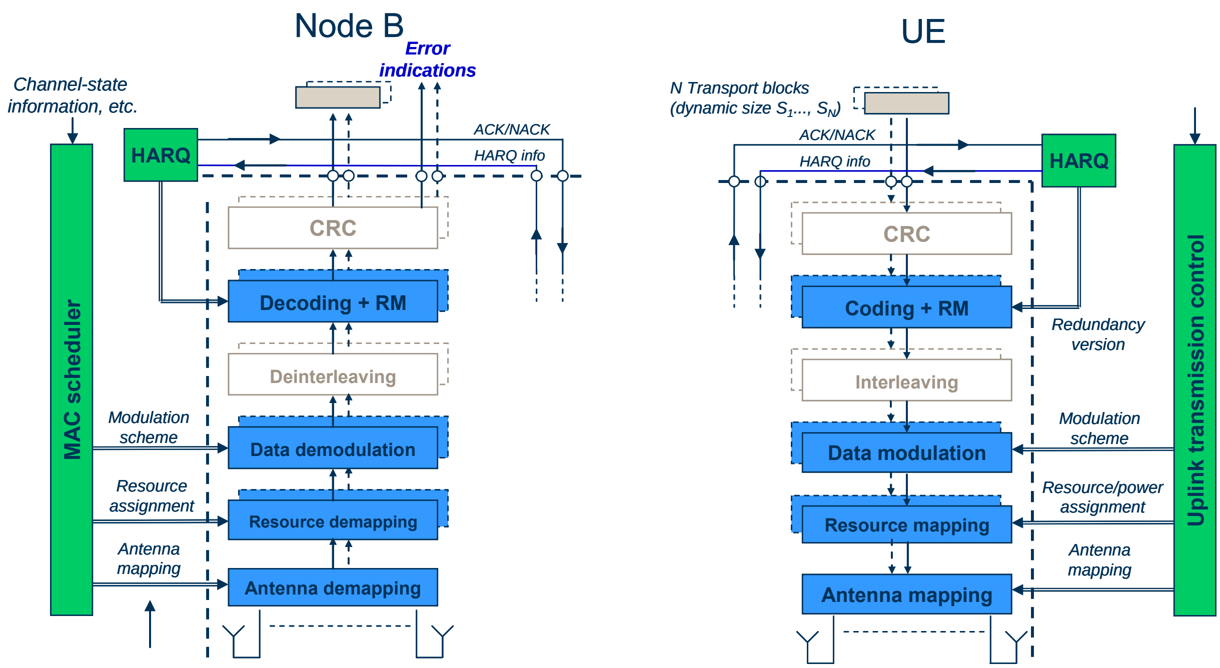
Element [16]

Supra, §VIII.C.3, Element [13]; EX1003, ¶81.

X. [GROUND 1C] – Obviousness Based On CATT183-Nokia476-TS_36_300 (Claims 17-20)

A. Overview Of TS_36_300

TS_36_300 is a 3GPP technical specification that "provides an overview and overall description of the E-UTRAN radio interface protocol architecture." EX1009, 1; EX1003, ¶¶43-44. TS_36_300 describes elements of the UE and eNodeB in E-UTRAN, and provides a physical layer model in Figure 5.4.1.5:



EX1009, FIG. 5.4.1.5 (p. 29).

TS_36_300 explains that the medium access controller (MAC) in eNB "includes dynamic resource schedulers that allocate physical layer resources for the DL-SCH and UL-SCH transport channels." EX1009, 56. Regarding uplink scheduling, TS_36_300 discloses that "E-UTRAN can dynamically allocate resources (PRBs and MCS) to UEs at each TTI via the C-RNTI on L1/L2 control channel(s)." *Id.*, 56. Additionally, "E-UTRAN can allocate a predefined uplink resource for the first HARQ transmissions and potentially retransmissions to UEs." *Id.* For example, as shown in Figure 5.4.1.5, the eNB includes a HARQ functional unit associated with the MAC scheduler to facilitate performance of HARQ-related functions. *Id.*, §11.

B. Predictable Combination Of CATT183-Nokia476-TS_36_300

Element [17.P]

CATT183 discloses a UE as the recited "apparatus." EX1005, §§1, 2.2 (Alt 2); *see also* EX1006, §§2.1, 2.3; EX1009, §5.4.1.5, FIG. 5.4.1.5 (depicting UE); EX1003, ¶82; *supra*, §§VIII.C.1-2.

Element [17.1]

TS_36_300 discloses a HARQ functional unit in the UE, and confirms that HARQ functional units were standard UE components in E-UTRAN. EX1009, §5.4.1.5, FIG. 5.4.1.5 (depicting HARQ unit in UE). A POSITA would have implemented a HARQ functional unit in a UE in the CATT183-Nokia476-TS_36_300 combination for multiple reasons. EX1003, ¶83. For example, HARQ functional units were an ordinary part of the UE in E-UTRAN system in the relevant timeframe (e.g., October 5, 2007)—as confirmed by TS_36_300. *Id.*, ¶83. Second, a POSITA would have appreciated that HARQ-related operations (such as the transmission recited in element [17.1]) would naturally be performed with a HARQ functional unit since they fall within the scope of the HARQ functional unit's express purpose. *Id.*

As described in detail above (§VIII.C.1-2 and Element [11.1]), the HARQ functional unit would be configured to transmit a packet re-transmission in a HARQ process using a semi-persistently scheduled uplink resource. EX1003, ¶84; *supra*, §VIII.C.1-2, §VIII.C.3 (Element [11.1]).

Element [17.2]

The operations for receiving a dynamic allocation of a resource for a different HARQ process, and transmitting a new packet using the dynamically allocated resource in the different HARQ process would have been obvious for the reasons explained above. *Supra*, §VIII.C.3 (Element [11.2]); EX1003, ¶85. It further would have been obvious to configure a HARQ functional unit in the UE to perform/facilitate these operations, for the reasons discussed in Element [11.1]. *Supra*, Element [11.1]; EX1009, §5.4.1.5, FIG. 5.4.1.5 (depicting HARQ unit in UE); EX1003, ¶85; *supra*, Element [11.2], §VIII.C.1-2.

Element [18]

Supra, §VIII.C.3, Element [12]; EX1003, ¶86.

Element [19]

TS_36_300 expressly confirms that the UE in an E-UTRAN system such as CATT183 includes a receiver for receiving transmissions from the eNB. TS_30_300, §5.4.1.5, FIG. 5.4.1.5 (depicting UE with receiver) ("receiver side"). The resulting CATT183-Nokia476-TS_36_300 combination would predictably include a receiver in the UE to receive the dynamic allocation of resources for a second/different HARQ process from the eNB (***network element***). *Supra*, §§VIII.C.1-2, VII.C.3 (Element [11.2]); EX1003, ¶87.

Element [20]

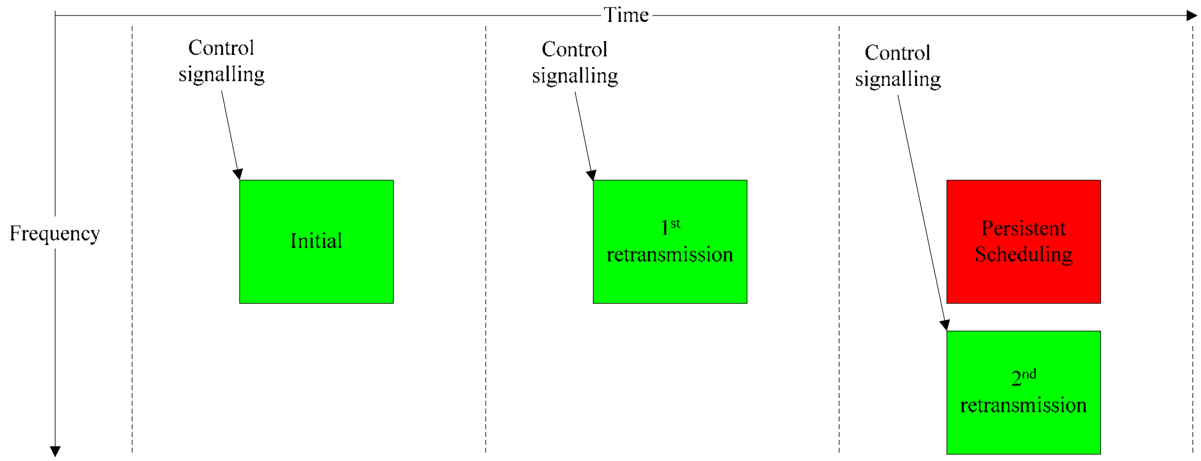
As described above (§VIII.C.1-2), the apparatus is embodied in a user equipment (UE). *Supra*, Element [17.P], §VIII.C.1-2; EX1003, ¶88; EX1009, §5.4.1.5, FIG. 5.4.1.5 (depicting UE).

XI. [GROUND 1D] – Obviousness Based On CATT183-Nokia476-TS_36_300-CATT115 (Claims 1, 3-4, 7-10)

A. Overview Of CATT115

Like CATT183, CATT115 describes the problem of collisions that occur "when using synchronous HARQ" in the E-UTRA uplink. EX1007, 1; EX1003, ¶¶45-46. To this end, CATT115 proposed solutions for "collision resolution." *Id.*, 1. Among these solutions, CATT115 describes an option for dynamically allocating resources for retransmission of a first packet, while using predefined resources (from persistent scheduling) for initial transmission of a second packet. *Id.*, 1-2.

> With adaptive synchronous HARQ, it seems that the collisions incurred due to synchronous operation can easily avoid by changing the resource unit assignment of special retransmission that will conflict with other transmission. Fig 1 shows an example.



> In Fig 1, after the 1st retransmission fails, the MAC scheduler becomes aware of that the 2nd retransmission will conflict with persistent scheduling. So the scheduler notices the UE that the 2nd retransmission will continue in different resource units from previous retransmission by corresponding control signalling.

EX1007, 1-2.

B. Predictable Combination Of CATT183-Nokia476- TS_36_300-CATT115

1. Overview Of First Alternative Combination

As described in detail above (§VIII.C.1), it would have been obvious to modify CATT183 according to Nokia476's suggestion for dynamic resource allocation such that the secondary resource would not be predefined, but would rather be dynamically allocated in response to identifying a scheduled collision. EX1003, ¶¶89-98.

It was known by the relatively late timeframe of the '480 patent's earliest possible priority date (October 5, 2007) that E-UTRAN systems could allocate uplink resources to a UE either in response to an explicit resource request from the UE or in the absence of an explicit request from the UE.[4] EX1003, ¶90. For example, Nokia476 describes how "fully dynamic scheduling" involves the "UE send[ing] a resource request in UL for every VoIP packet" and "semi-persistent scheduling" involves the "UE [] sending[ing] a resource request" when "a talk spurt starts." EX1006, §§2.1, 2.3. In the case of semi-persistent scheduling, the UE's resource request can result in a persistently scheduled resource for initial transmissions while "[a]ll [] retransmissions are allocated dynamically." *Id.*, §2.3. The dynamic scheduling of retransmissions provides one example of the eNB automatically allocating uplink resources in the absence of an explicit resource request from UE. *Id.*

CATT115 further demonstrates the predictability of implementing unsolicited resource allocations to accommodate separate transmissions of packets that incur a

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[4] As shorthand, this Petition refers to uplink resource allocations that occur in response to an explicit request from the UE as a "solicited" resource allocation. Uplink resource allocations that occur in the absence of an explicit request from the UE are referred to as "unsolicited" allocations. EX1003, ¶90.

scheduled collision due to synchronous HARQ and persistent scheduling. EX1007, §2.1; *supra*, §VIII.C. In particular, when "the MAC scheduler becomes aware [] that [a] 2nd retransmission will conflict with persistent scheduling," "the scheduler notices the UE that the 2nd retransmission will continue in different resource units from previous retransmission by corresponding control signaling." *Id.*; EX1003, ¶91.

It would have been obvious to further modify the First Alternative CATT183-Nokia476 system (§VIII.C.1) based on CATT115's suggestion (e.g., unsolicited resource allocations for uplink-transmission conflict resolution) such that the eNB would dynamically allocate a secondary resource to the UE in response to detecting a scheduled collision between a retransmission of a first packet and an initial transmission of a second packet. EX1003, ¶92. In this system as predictably modified by CATT115, the eNB would allocate the secondary resource in an unsolicited manner in response to detecting a scheduled collision, without an explicit request from the UE. *Id.* For example, notifying the UE of the dynamic uplink resource allocation would predictably involve sending a signal indicating resource allocation from the eNB to the UE on the downlink L1/L2 control channel (e.g., in a MAC control PDU). *See* EX1006, §2.3; EX1003, ¶92.

A POSITA would have been prompted to apply CATT115's suggestion for

unsolicited resource allocation to the resulting combination for a number of reasons. EX1003, ¶93. **First**, by implementing unsolicited allocation of CATT183's secondary resource according to the teachings of CATT115, the resulting system would have advantageously reduced the amount of signaling overhead incurred relative to approaches that required the UE to send an explicit resource request to the eNB. EX1003, ¶93. The benefits of reducing signaling overhead were well understood before the earliest possible priority date of the '480 patent (October 5, 2007), and tends to provide more efficient resource usage between the UE and eNB. *Id.*

Second, a POSITA would have recognized that the eNB was ideally positioned to detect impending collisions between transmissions and retransmissions from a UE (and thus would not need to rely on an explicit resource request from the UE to understand when a secondary resource is needed). EX1003, ¶94. The eNB is the entity that determines when retransmission of a packet is necessary (e.g., due to unsuccessful receipt of a prior uplink transmission), and the eNB tracks UE transmissions according to persistent scheduling and HARQ parameters. EX1003, ¶94. Accordingly, as CATT115 acknowledged, the eNB can readily identify scheduled collisions and the need for dynamic allocation of additional resources. EX1007, §2.1. Indeed, the '480 patent itself assumes a POSITA would have understood how the eNB would detect collisions since it provides little detail on this operation, and

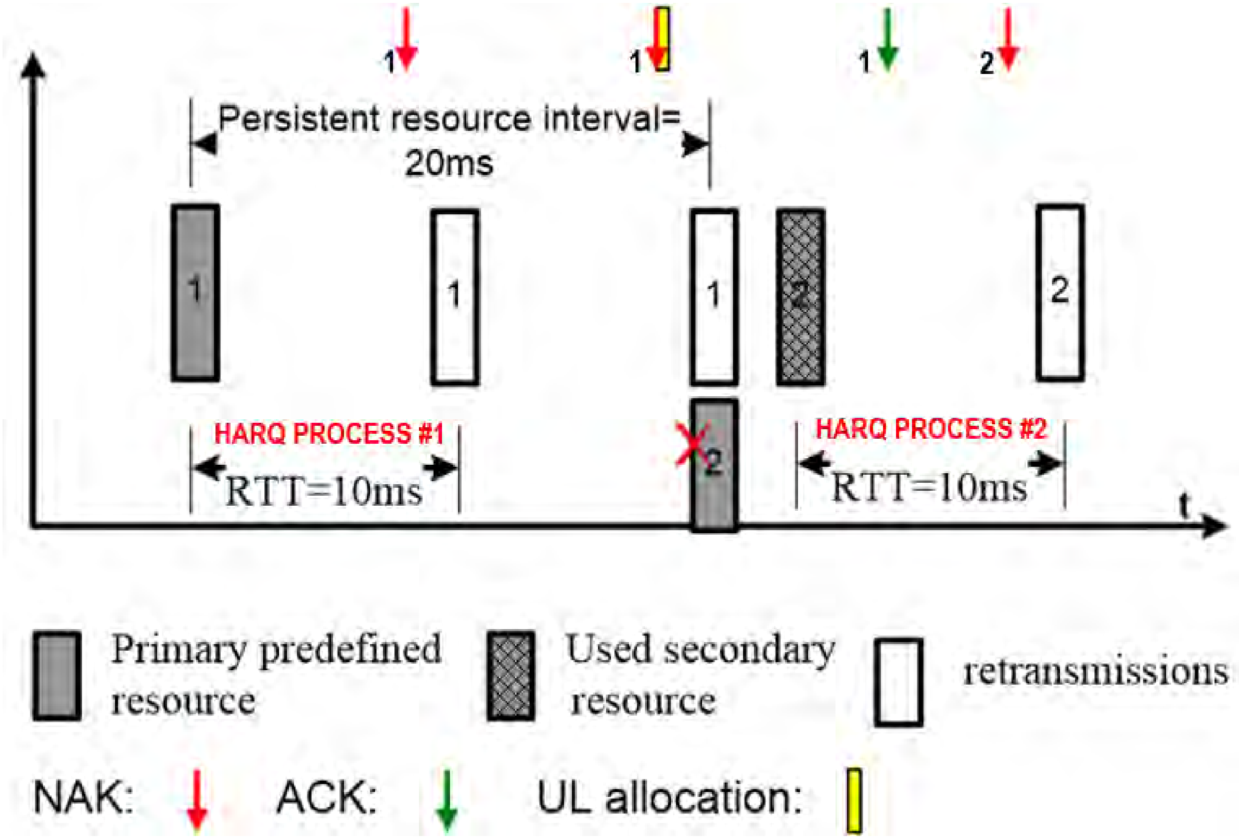
CATT115 provides at least as much detail as the '480 patent in this regard. *In re Epstein*, 32 F.3d 1559, 1568, (Fed. Cir. 1994) ("[T]hat appellant did not provide the type of detail in his specification that he now argues is necessary in prior art references supports the Board's finding that one skilled in the art would have known how to implement the features of the references.").

Third, implementing the combined system according to CATT115's suggestion for unsolicited resource allocation would have involved the mere application of a known technique (CATT115's unsolicited resource allocation) to a predictable system (CATT183-Nokia476) to yield no more than predictable results. EX1003, ¶95; *KSR*, 550 U.S. at 417.

Fourth, a POSITA would have considered CATT115's suggestion for unsolicited resource allocation obvious to try in the context of the combined system based on CATT183 (e.g., such that the eNB performs unsolicited dynamic allocation of the secondary resource). The evidence here confirms that there are broadly just two options for prompting allocation of uplink resources to a UE: either (1) responsive to an explicit resource request from the UE or (2) by the eNB's detection of some condition indicating the need for an uplink resource other than the explicit request from the UE. EX1003, ¶96. Given these two known and finite options, it would have been obvious to try unsolicited allocations in typical implementations of the

system to achieve the predictable benefits associated with this approach as described above. EX1003, ¶96; *Uber*, 957 F.3d at 1340.

Accordingly, for the reasons discussed herein, a predictable combination of CATT183, Nokia476, and CATT115 would have resulted in a system that did not provide a predefined, persistently scheduled secondary resource. Instead, the eNB would dynamically allocate (and without solicitation from the UE) the secondary resource as needed upon detecting a conflict between the retransmission of first packet and a scheduled transmission of a second packet. EX1003, ¶¶97-98. Mr. Rysavy provided the following illustration depicting an ordinary implementation of the First Alternative combination as modified further in view of CATT115:



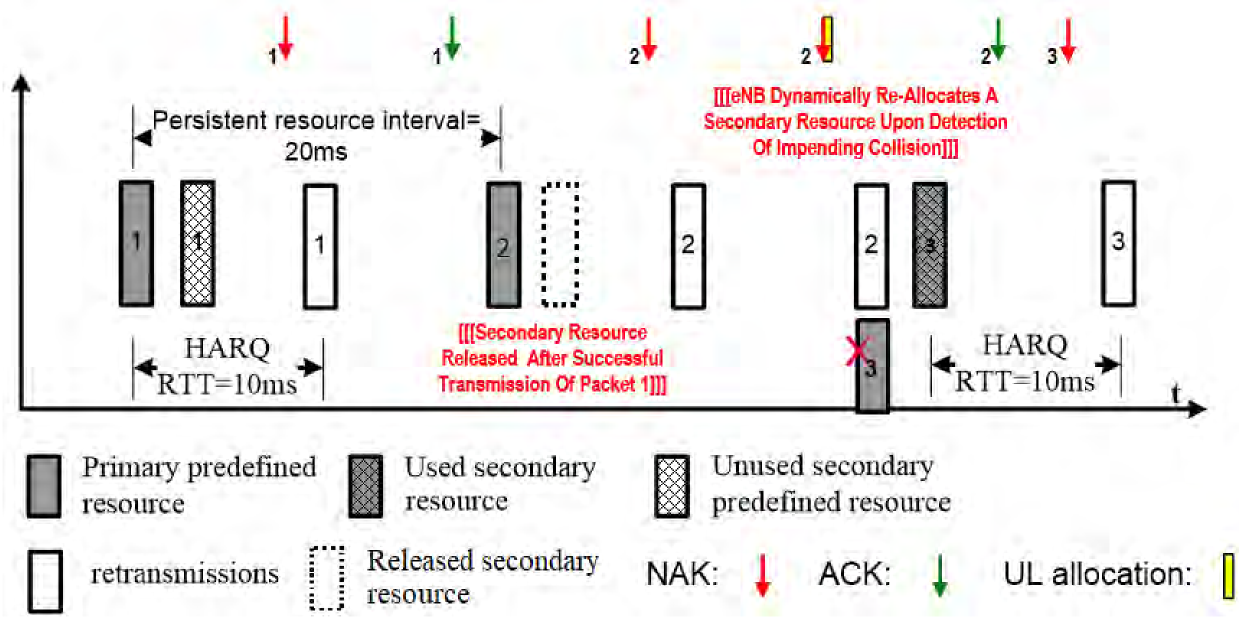
EX1003, ¶97.

2. Overview Of Second Alternative Combination

As described in detail above (§VIII.C.2), it would have been obvious to modify CATT183 according to Nokia476's suggestion for dynamic resource allocation such that a predefined secondary resource can be recovered after its release, upon identifying a scheduled collision. EX1003, ¶¶99-100.

Dynamically re-allocating the secondary resource to the UE by unsolicited notification when the eNB identifies a potential collision between a scheduled retransmission and initial transmission (as suggested by CATT115) also would have

been obvious to implement in the Second Alternative combination for substantially similar reasons to those discussed above (§XI.B.1). EX1003, ¶¶100, 89-98. A POSITA would have applied unsolicited dynamic re-allocation of the secondary resource in the resulting combination to reduce signaling overhead that would otherwise be required for the UE to send an explicit resource request to the eNB. EX1003, ¶100. Additionally, a POSITA would have recognized that the eNB would be in an ideal position to detect scheduled collisions between transmissions and retransmissions from a UE, and as described above (§XI.B.1), unsolicited resource allocation would have achieved predictable results and would have been obvious to try. EX1003, ¶100. Mr. Rysavy provided the following illustration depicting an ordinary implementation of the Second Alternative combination as modified further in view of CATT115:



EX1003, ¶100.

3. Claim Element Analyses

Element [1.P]

Supra, §VIII.C.3, Element [11.P]; EX1003, ¶101.

Element [1.1]

CATT183's "Alt 2" embodiment (§2.2) discloses a system configured to identify a scheduled collision between an uplink packet-retransmission and a new uplink packet transmission within a (first) HARQ process using the primary predefined resource. EX1005, §2.2 ("If there is the 2nd retransmission of the last voice packet use the primary predefined resource, then the initial transmission of the current voice packet will use the secondary predefined resource."), FIG. 3; *supra*, §VIII.A. The collision is detected within a HARQ process at least because the transmission are

scheduled during the same subframe/TTI from the same UE. *Id.*; *cf.* EX1001, FIG. 1; EX1003, ¶¶102-105.

Furthermore, as explained in detail above (§§VIII.C.1-2, XI.B.1-2), the predictable First and Second Alternative CATT183-Nokia476-CATT115 combinations specifically provide an eNB configured to perform the recited detection by identifying a scheduled collision between the uplink packet re-transmission and the new uplink packet transmission. EX1003, ¶103; *supra*, §§VIII.C.1-2, XI.B.1-2.

CATT115 further discloses a "MAC scheduler" at the eNB that "becomes aware [] that the 2nd retransmission will conflict with persistent scheduling." EX1007, §2.1.

To the extent CATT183, Nokia476, and CATT115 do not expressly disclose the recited "[HARQ] function," (or HARQ functional unit) TS_36_300 confirms that such a function was an ordinary feature of eNBs in E-UTRAN at the time (e.g., October 5, 2007). EX1009, FIG. 5.4.1.5 (p. 29); *supra* §X.A. It would have been obvious to implement the First and Second Alternative CATT183-Nokia476-CATT115 combinations according to TS_36_300's suggestion for a HARQ function (or functional unit) such that the HARQ function in the resulting system would detect the collision (e.g., identify the scheduled collision) between the uplink packet

re-transmission and the new uplink packet transmission within the first HARQ process in the primary resource and dynamically allocate resources to a HARQ process (as recited in element [1.2]). EX1003, ¶104.

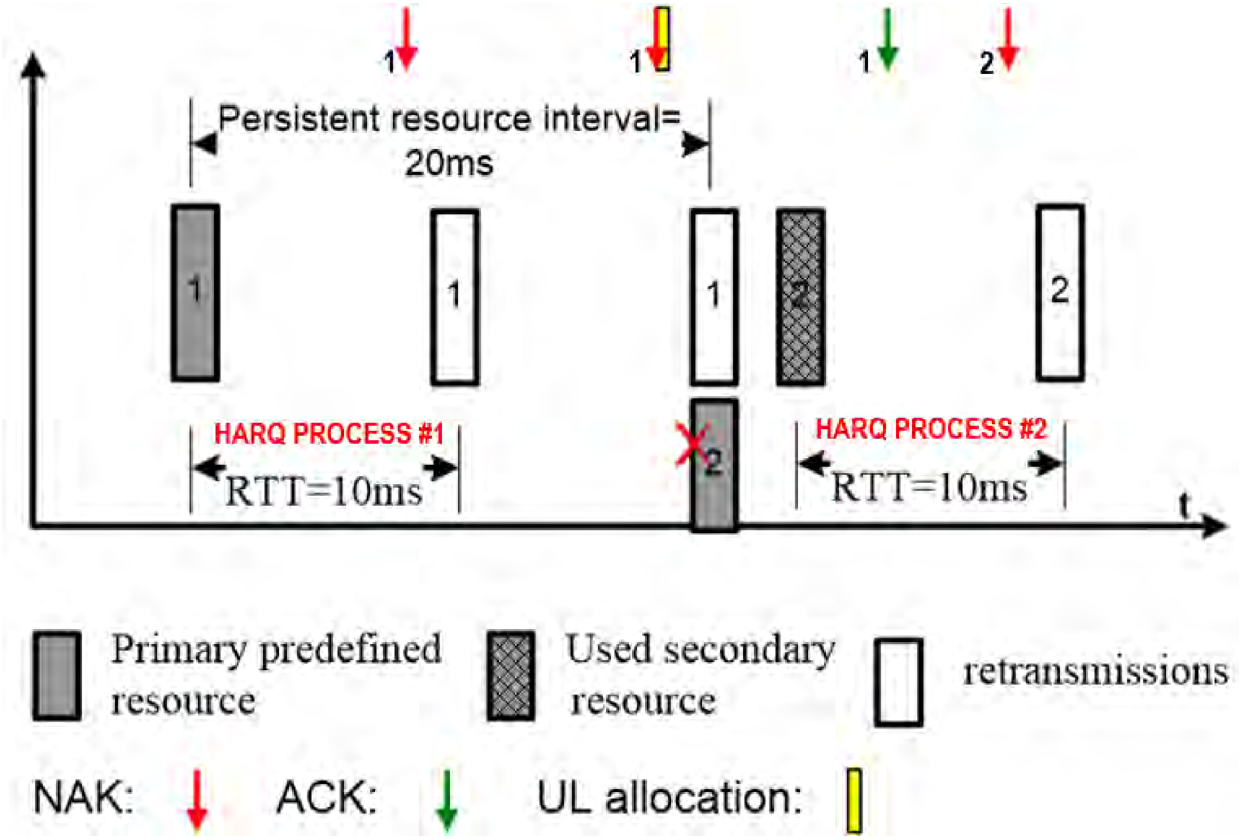
A POSITA would have been prompted to implement this combination for multiple reasons. EX1003, ¶105. **First**, the HARQ function was a defined aspect of the eNB in the E-UTRAN system in the relevant timeframe (e.g., October 5, 2007)—as confirmed by TS_36_300. *Id.*, ¶105. **Second**, a POSITA would have appreciated that HARQ-related operations (such as the recited "detecting" and "dynamically allocating" operations) would naturally be performed using the HARQ function since HARQ operations are within the expected scope of a functional unit dedicated to HARQ. *Id.* **Third**, the HARQ function is consistent with CATT115's suggestion for implementing a "MAC scheduler" since E-UTRAN provides "HARQ within the MAC sublayer." EX1007, §2.1; EX1009, §9.1 (p. 39). The resulting combination thus would have achieved predictable results consistent with typical use of a HARQ function, and a POSITA would have expected a high likelihood of success in implementing the combination. EX1003, ¶105.

Element [1.2]

CATT183's 'Alt 2' embodiment diverts the initial transmission of a second packet from a first HARQ process using a first predefined resource to a second

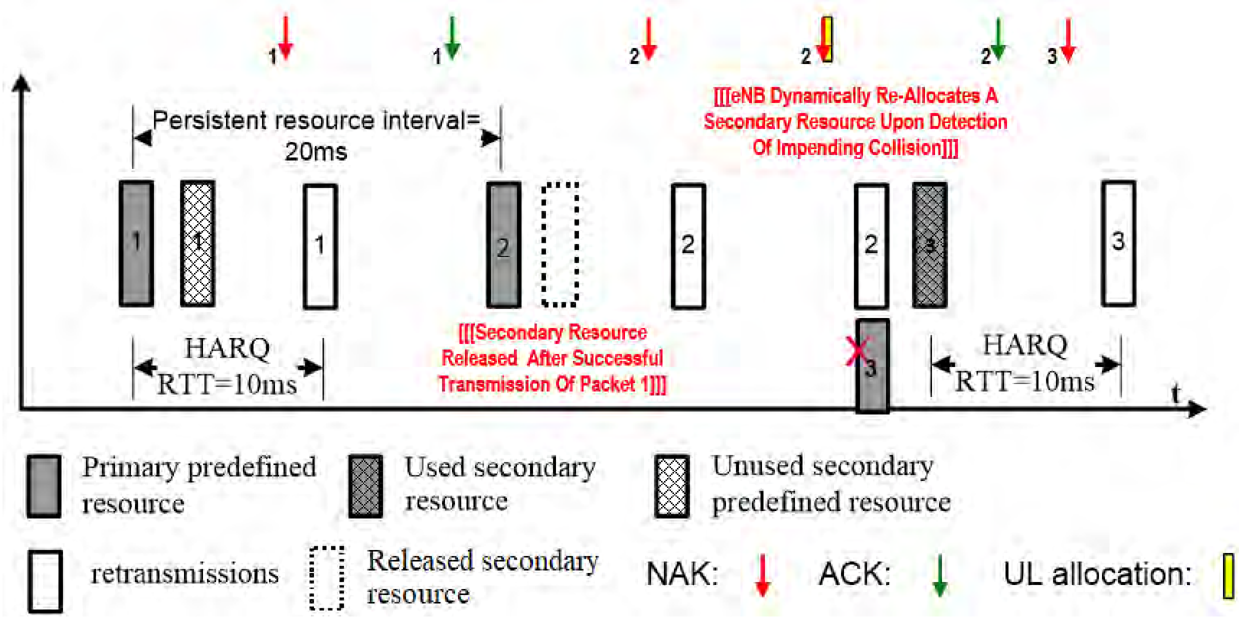
HARQ process using a second predefined resource in a different subframe/TTI responsive to detecting a scheduled collision between the initial transmission of the second packet and a retransmission of a first packet in the first HARQ process. EX1005, §2.2 (Alt 2); *supra* §VIII.A; EX1003, ¶106. Nokia476 further discloses dynamic resource allocation, and CATT115 suggests use of dynamic resource allocations to avoid collision between retransmissions and initial transmissions in a HARQ process. EX1006, §§2.1, 2.3; EX1007, §2.1; *supra*, §§VIII.B-C. For the reasons described in detail above (§§VIII.C.1-2, XI.B.1-2), it would have been obvious to combine the teachings of CATT183, Nokia476, and CATT115, and the resulting First and Second Alternative combinations would have dynamically allocated, in response to detecting an impending collision (*supra* Element [1.1]), a secondary resource for transmitting the new uplink packet transmission in a different (second) HARQ process that does not collide with the uplink packet re-transmission in the first HARQ process. EX1003, ¶106. Based on TS_36_300, it further would have been predictable for these functions to be performed with a HARQ function at the eNB (as explained above (Element [1.1])). EX1003, ¶106.

First Alternative:



EX1003, ¶106.

Second Alternative:



Id.

Element [3]

Nokia476 teaches that uplink resource allocations in E-UTRAN are sent over the DL L1/L2 control channel (***physical downlink control channel***). EX1006, §2.3 ("allocation is sent [] on L1/L2 control channel"), ("allocated dynamically using the L1/L2 control channel"), FIG. 3, §2.1 ("L1/L2 control signaling"), FIG. 1. As described above (§VIII.C.1-2, XI.B.1-2), the predictable CATT183-Nokia476-TS_36_300-CATT115 combinations would have provided for the allocated resource to be sent on the DL L1/L2 control channel according to Nokia476's suggestion. *Supra*, §VIII.C.1-2, XI.B.1-2; EX1003, ¶107; *infra*, §XIV (Element [3]).

Element [4]

As described in detail above (§VIII.C.1-2, XI.B.1-2), the methods of both

First and Second Alternative CATT183-Nokia476-TS_36_300-CATT115 combinations are executed by a network element such as an eNB with a HARQ function in an E-UTRAN system. EX1007, §2.1 ("MAC scheduler"); EX1009, §5.4.1.5, FIG. 5.4.1.5 (depicting eNB); EX1006, §§2.1, 2.3 ("Node B"); *supra*, §VIII.C.1-2; EX1003, ¶108.

Element [7.P]

According to the teachings of CATT183 and TS_36_300, the CATT183-Nokia476-CATT115-TS_36_300 combinations provide the recited "apparatus," as an eNB or a component of the eNB that implements MAC/HARQ functions. EX1005, §2.2 (Alt 2); EX1009, §5.4.1.5; *supra*, §VIII.C.1-2; EX1003, ¶109.

Element [7.1]

Supra, Element [1.1]; EX1003, ¶110.

Element [7.2]

Supra, Element [1.2]; EX1003, ¶111.

Element [8]

TS_36_300 teaches that the apparatus that implements MAC scheduling and HARQ functions is embodied in the eNB (***network element***). EX1009, §5.4.1.5, FIG. 5.4.1.5; EX1003, ¶112; *supra*, Element [7.P], §VIII.C.1-2.

Element [9]

Supra, §VIII.C.3, Element [12]; EX1003, ¶113.

Element [10]

Supra, Element [3]; EX1003, ¶114.

XII. [GROUND 1E] – Obviousness Based On CATT183-Nokia476-TS_36_300-CATT115-Ranta (Claims 5-6)

A. Predictable Combination Of CATT183-Nokia476-CATT115-TS_36_300-Ranta

Element [5.P]

To the extent the preamble is a limitation, Ranta discloses the recited "computer readable medium." EX1010, [0052]; *see also* [0053]-[0055], FIG. 1; *supra*, §IX.A. It would have been obvious to further modify the CATT183-Nokia476-CATT115-TS_36_300 in view of Ranta such that the UE and eNB would provide computer-readable media encoded with a computer program product according to Ranta's suggestion for at least the reasons described in §IX.B, Element [14.P]. EX1003, ¶115.

Element [5.1]

Supra, §XI.B, Element [1.1]; EX1003, ¶116.

Element [5.2]

Supra, §XI.B, Element [1.2]; EX1003, ¶117.

Element [6]

Supra, §XI.B, §VIII.C.3, Element [12]; EX1003, ¶118.

XIII. [GROUND 2A] – Obviousness Based On CATT115-Kuusela-TS_36_300 (Claims 1, 4, 7-9)

A. Overview Of Kuusela

Kuusela discloses techniques for "improve[ing] capacity in the context of, for example, VoIP on [High Speed Uplink Packet Access (HSUPA)] or any other discontinuous data transmission." EX1008, [0015]; *generally id.*, [0015]-[0026], Abstract; EX1003, ¶¶47-49.

Like CATT183 and CATT115, Kuusela similarly highlights the problem of collisions between retransmissions in a HARQ process and initial transmissions of VoIP packets. For instance, Kuusela explains that "[i]n case of 10 ms TTI, a simple principle with VoIP service using a packet every 20 ms would be, for example, to allow transmission of only every second ARQ process (odd or even)." EX1008, [0023].

Specifically, Kuusela discloses two predictable alternatives for resolving a conflict between a "retransmission" and an initial transmission for the next VoIP packet: (1) "the retransmission could be delayed by one 10 ms frame taking the place of a normally unused process," or (2) "[a]lternatively, the new transmissions could be delayed by one 10 ms frame, taking the place of [a] normally unused process and without delaying the retransmission." *Id.*, [0024]-[0025]; *see also id.*, [0016].

B. Predictable Combination Of CATT115-Kuusela-TS_36_300

The teachings of CATT115, Kuusela, and TS_36_300 would have been predictable to combine as described below in §§XIII.B.1, and would have rendered claims 1, 4, and 7-8 of the '480 patent obvious. EX1003, ¶35. Further, the combination would have provided each element of claims 1, 4, and 7-8 as described below in §XIII.B.2. *Id.*

1. Overview Of Combination

As previously discussed (§XI.A), CATT115 acknowledges the well-known problem that "synchronous HARQ" in E-UTRAN can "lead[] to collisions while other mechanisms are adopted at the same time, such as persistent scheduling." EX1007, §2. CATT115 explains that "collisions incurred due to synchronous operation can easily avoid [sic] by changing the resource unit assignment of special retransmission that will conflict with other transmission." *Id.*, §2.1.

CATT115 lacks express detail regarding certain aspects of changing a "resource unit assignment" for a conflicting transmission, and does not expressly disclose that the dynamically allocated resources are scheduled for a different HARQ process. Nonetheless, a POSITA would have looked to Kuusela for a predictable solution in this regard. EX1003, ¶¶119-133; *supra*, §XII.A. In particular, Kuusela teaches that collisions within a HARQ process in a same subframe/TTI from a same

UE can be resolved by diverting one of the conflicting transmissions to a second HARQ process different from a first HARQ process where the collision was scheduled to occur. EX1007, [0023]-[0025]; *supra*, §XII.A. Kuusela's teaching here (e.g., diverting a conflicting transmission to a different HARQ process) would have been obvious to apply to CATT115. EX1003, ¶120. In the resulting system, CATT115's suggestion for changing the resource unit assignment of a conflicting transmission would involve moving that transmission to an entirely separate HARQ process from a first HARQ process where the conflicting transmissions were both originally scheduled to occur, according to Kuusela's suggestion. EX1003, ¶120.

Multiple reasons would have prompted a POSITA to implement CATT115's system according to Kuusela's suggestion for diverting a conflicting transmission to a different HARQ process.[5] EX1003, ¶121. **First**, LTE (E-UTRAN) systems al-

[5] Petitioner acknowledges that CATT115 pertains to an E-UTRAN system, while Kuusela's disclosure focuses on WCDMA systems. *Compare* EX1007 *with* EX1008, [0002]. Nonetheless, these differences would not have dissuaded a POSITA from implementing the CATT115-Kuusela-TS_36_300 system as described herein. EX1003, ¶125. Aspects of the VoIP services and HARQ processes

ready provided support for multiple HARQ processes for separately managing transmissions of different uplink packets. *Id.*, ¶122. It would have been predictable to direct a retransmission of a first packet and an initial transmission of a second packet to different HARQ processes based on Kuusela's suggestion since doing so would simply entail advantageously utilizing parallel HARQ processes in LTE according to their ordinary purposes. *Id.*, ¶122.

Second, by diverting a conflicting transmission to a separate HARQ process, the transmissions of the respective packets associated with a scheduled collision would benefit from independent management in the respective HARQ processes. EX1003, ¶123. For instance, retransmissions of a first packet can continue for so long as necessary and permitted by parameters of the HARQ process, while the second packet would be subject to independent retransmissions as needed, thereby promoting reliable delivery mechanisms for both packets. *Id.*, ¶123.

Third, the combination would have involved the mere application of a known

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provided in these wireless systems were substantially similar, and a POSITA would have appreciated the relevance of Kuusela's teachings beyond the specific context of WCDMA (including in E-UTRAN). EX1008, [0033] ("numerous other embodiments"); *id*.

technique (Kuusela's diversion of a conflicting resource to a separate HARQ process) to a known system (CATT115's E-UTRAN) that was ripe for improvement, and would have yielded no more than predictable results. EX1003, ¶¶124-125; *KSR*, 550 U.S. at 417.

Notably, the conflicting transmission for which CATT115 dynamically allocates different resource units is the retransmission for the first packet (rather than the initial transmission of a second packet provided by persistent scheduling). *See* EX1007, FIG. 1. However, a collision would of course be resolved by diverting ***either*** the first packet retransmission ***or*** the second packet initial transmission—and, indeed, Kuusela confirms that both options were known before the earliest possible priority date of the '480 patent (October 5, 2007). EX1008, [0024] ("retransmission could be delayed by one 10 ms frame taking the place of a normally unused process"), [0025] ("[a]lternatively, the new transmissions could be delayed by one 10 ms frame, taking the place of normally unused process and without delaying the retransmission"); EX1003, ¶126.

For ordinary implementations of the system resulting from the combination of CATT115 and Kuusela, diversion of the first conflicting transmission to a different HARQ process would have been obvious according to the teachings of Kuusela. EX1003, ¶127. With regard to moving the initial transmission for a new packet to a

separate HARQ process, a POSITA would have been motivated to choose this option in particular for several reasons. *Id.*

First, diverting the initial transmission for the new packet to a separate HARQ process would have been obvious to try. EX1003, ¶128. Only two options are available here—either the retransmission or the initial transmission can move to the separate HARQ process. *Id.* Given these two known options, it would have been obvious to implement a system that diverts the initial transmission as a matter of design choice and to achieve at least the various benefits described in the following paragraphs. *Id.*; *Uber*, 957 F.3d at 1340.

Second, by diverting the initial transmission of the new packet, a POSITA would have recognized benefits in maintaining retransmission of the first packet in the same HARQ process in which it began. EX1003, ¶129. Complexity associated with changing the first packet's HARQ process before successful receipt by the eNB would thus be avoided, and standard retransmission operations of the first HARQ process would be maintained. *Id.*, ¶129.

Third, the combination would have involved the mere application of a known technique (Kussela's suggestion to divert an initial transmission to a separate HARQ process) to a known system (CATT115's E-UTRAN) that was ripe for improvement, and would have yielded no more than predictable results. EX1003, ¶130; *KSR*, 550

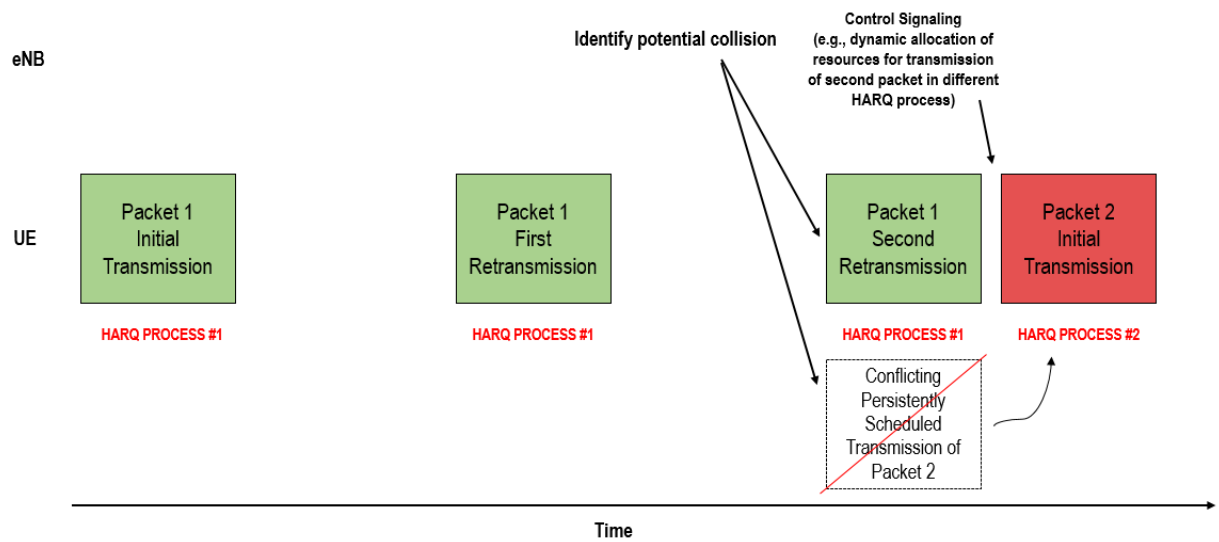
U.S. at 417.

Moreover, by modifying CATT115 according to Kuusela's suggestion to divert the initial transmission of a new packet to the separate HARQ process rather than the re-transmission of a first packet, it is not necessary that the resulting system employ adaptive HARQ as provided in CATT115. EX1007, §2.1; EX1003, ¶131. This follows from the fact that retransmissions in the CATT115-Kuusela system are maintained in the same HARQ process and would not necessarily require a change in resource units or other changes that would be signaled by adaptive HARQ. *Id.* Thus, CATT115's stated preference for non-adaptive HARQ would not have dissuaded a POSITA from implementing a system based on the teachings in §2.1 (regarding adaptive synchronous HARQ). *Id.* This is especially true since the options of adaptive and non-adaptive synchronous HARQ were still being studied for inclusion in the LTE standard as of the earliest possible priority date of the '480 patent (October 5, 2007). EX1003, ¶131.

Finally, CATT115 discloses that the "MAC scheduler" of an eNB is the entity that identifies a scheduled collision and dynamically allocates different resources for a conflicting transmission. EX1007, 1. TS_36_300 further describes the structure and functions of the eNB in E-UTRAN, and discloses a HARQ functional unit associated with the MAC scheduler. EX1009, p. 29; *see also id.*, §5.4.1.5. TS_36_300

also confirms that E-UTRAN implements HARQ within the "MAC sublayer," and so the MAC sublayer would include a HARQ function encompassing HARQ-related functions. EX1009, p. 39, §9. It would have been obvious to further modify CATT115-Kuusela based on TS_36_300 such that the HARQ function in the MAC sublayer of the eNB would handle HARQ-related tasks including detecting collisions and facilitating dynamic allocation and diversion of resources for the initial transmission of a packet from the UE in a different HARQ process. EX1003, ¶132. A POSITA would have been motivated to implement the resulting combination with a HARQ function in the eNB according to the suggestion of TS_36_300 for multiple reasons, including that (1) such structure is consistent with the eNB architecture explicitly provided in the LTE standard, (2) the HARQ unit would be naturally well-suited to handle HARQ-related tasks consistent with its intended function, and (3) the resulting system would have achieved no more than predictable results. *KSR*, 550 U.S. at 417.

Mr. Rysavy provided the following illustration depicting an ordinary implementation of a system resulting from the predictable combination of teachings from CATT115-Kuusela-TS_36_300:



EX1003, ¶133.

2. Claim Element Analyses

Element [1.P]

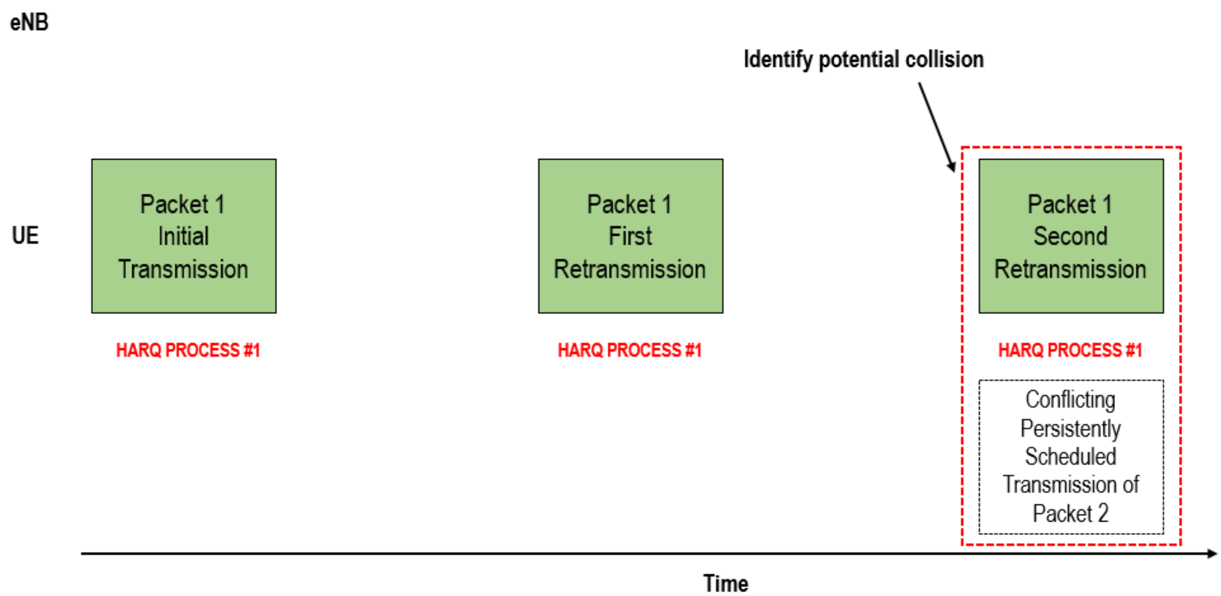
To the extent the preamble is limiting, CATT115 discloses a method for collision resolution in E-UTRAN. EX1007, §2.1; *supra*, §XIII.B.1; EX1003, ¶134.

Element [1.1]

CATT115 discloses that "collisions incurred due to synchronous operation can easily avoid [sic] by changing the resource unit assignment of special retransmission that will conflict with other transmission," and "after the 1st retransmission fails, the MAC scheduler becomes aware [] that the 2nd retransmission will conflict with persistent scheduling." EX1007, §2.1. Moreover, Kuusela discloses "a simple principle with VoIP service using a packet every 20 ms would be, for example, to

allow transmission of only every second ARQ process (odd or even)," while "taking into account an additional process for when retransmission is needed and there would be a conflict between the retransmission and the next packet arriving." EX1008, [0023]; *see also id.*, [0024]-[0025]. Furthermore, to the extent CATT115 does not expressly disclose a "HARQ function," TS_36_300 discloses such a "HARQ function" in the eNB. EX1009, FIG. 5.4.1.5 (p. 29); *supra* §X.A; EX1003, ¶¶135-137.

As explained in detail above (§XIII.B.1), the predictable combination of CATT115-Kuusela-TS_36_300 would have detected (according to CATT115's and Kuusela's suggestions), with a HARQ function (according to TS_36_300's suggestion), a scheduled collision between an uplink packet re-transmission and a new uplink packet transmission within a HARQ process, as recited in claim 1. EX1003, ¶¶119-133. For example, the HARQ function at the eNB would detect a collision between a second retransmission and a persistently scheduled voice packet, as shown in the following figure:



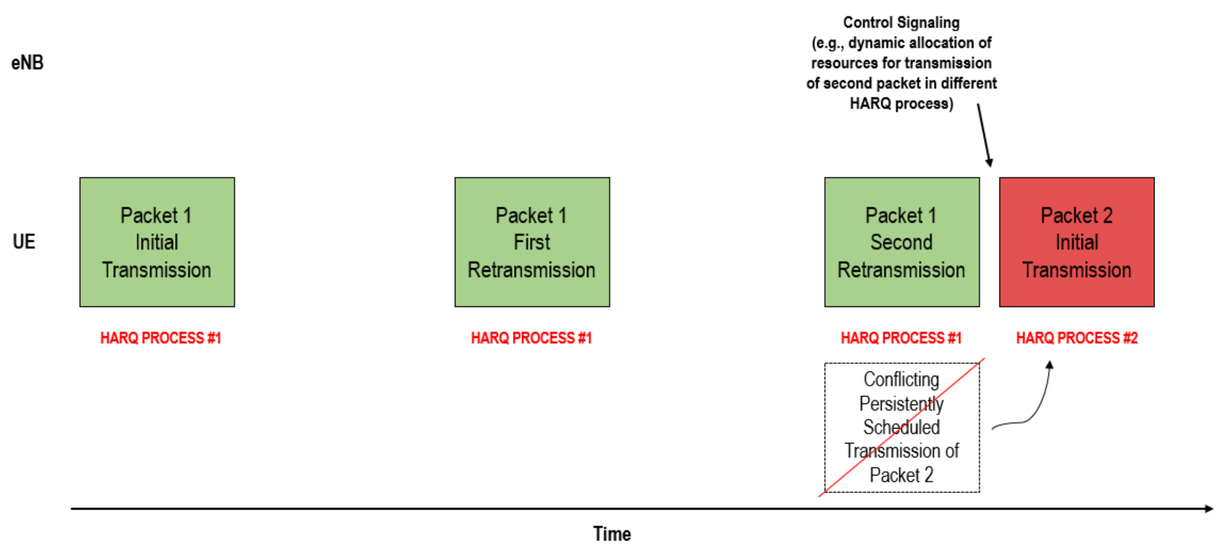
EX1003, ¶136; *supra*, §XIII.B.1.

Element [1.2]

CATT115 discloses that, in response to detecting a scheduled collision, "the scheduler notices the UE that the 2nd retransmission will continue in different resource units from previous retransmission by corresponding control signaling." EX1007, §2.1. CATT115 does not expressly disclose that the resources are allocated for transmitting the new uplink packet in a different HARQ process, but Kuusela discloses these features. EX1008, [0023]-[0025]; *supra*, §XIII.A. TS_36_300 also discloses the well-known "HARQ function" defined in E-UTRAN at the eNB. EX1009, FIG. 5.4.1.5 (p. 29); *supra* §X.A.

For the reasons explained in detail above (§XIII.B.1), it would have been obvious to modify CATT115 in view of Kuusela such that, in response to detecting a

scheduled collision, the eNB dynamically allocates resources to the UE for transmitting the new uplink packet transmission in a different HARQ process in a different subframe that does not collide with the uplink packet re-transmission. EX1003, ¶¶138-139. Additionally, for the reasons explained above (§XIII.B.1), the eNB would predictably include a HARQ function (e.g., related to the MAC scheduler) to perform these operations.



EX1003, ¶139.

Element [4]

CATT115 discloses, and the resulting CATT115-Kuusela-TS_36_300 combination provides, that the method is predictably executed by an eNB (***network element***). EX1007, §2.1 ("MAC scheduler"); *supra*, §§XIII.B.1; EX1003, ¶140.

Element [7.P]

According to the teaching of CATT115 and TS_36_300, the resulting CATT115-Kuusela-TS_36_300 combination provides the recited "apparatus," as an eNB or a component of the eNB that implements MAC/HARQ functions . EX1007, §2.1 ("MAC scheduler"); EX1009, §5.4.1.5; *supra*, §XIII.B.1; EX1003, ¶141.

Element [7.1]

Supra, Element [1.1]; EX1003, ¶142.

Element [7.2]

Supra, Element [1.2]; EX1003, ¶143.

Element [8]

TS_36_300 teaches that the apparatus that implements MAC scheduling and HARQ functions is embodied in the eNB (***network element***). EX1009, §5.4.1.5, FIG. 5.4.1.5; EX1003, ¶144; *supra*, Element [1.P], §XIII.B.1.

Element [9]

TS_36_300 discloses "E-UTRAN can allocate a predefined uplink resource for the first HARQ transmissions ***and potentially retransmissions to UEs***." EX1009, §11.1.2 (emphasis added). TS_36_300 thus confirms that capabilities for predefining not just the initial transmission in a HARQ process but also retransmissions were known—and indeed were actively explored for the E-UTRAN standard at the time of the earliest possible priority date of the '480 patent (October 5, 2007). EX1003,

¶145. By predefining a resource for both the initial transmission and retransmissions, the resource is "persistently" allocated within the meaning of that term as used in the '480 patent—e.g., since retransmissions do not need to be individually scheduled on a dynamic basis. EX1003, ¶145. Regardless whether the resource persists for transmissions of subsequent packets, the '480 patent provides that a resource can be "persistently" allocated even if the resource persists only for transmissions of a single packet. *See* EX1001, 7:7-11 ("[O]nly a new transmission that has collided with a re-transmissions need by dynamically scheduled to another HARQ process, as other new transmissions can occur in the persistent fashion in process #1 if the loading in HARQ process #1 is reasonable."), 7:65-67, 8:14-17, 8:33-36.

It would have been obvious to further modify the CATT183-Kuusela-TS_36_300 system according to TS_36_300's suggestion for allocating a predefined uplink resource for both the initial transmission and retransmissions in the different (second) HARQ process. EX1003, ¶146. A POSITA would have sought to implement this predictable option to reduce the control signaling that would otherwise be required to dynamically allocate individual retransmissions. EX1003, ¶146.

XIV. [GROUND 2B] – Obviousness Based On CATT115-Kuusela-TS_36_300-Nokia476 (Claims 3, 10)

Element [3]

As disclosed in CATT115, "the scheduler notices the UE that the 2nd retransmission will continue in different resource units from previous retransmission ***by corresponding control signaling***." EX1007, §2.1 (emphasis added), FIG. 3 ("control signaling"); *see also id.*, ("transmitter may change some or all of the transmission attributes"). To the extent CATT115 does not expressly disclose details of the control signals or how the allocated resources are sent to the UE, Nokia476 teaches that uplink allocations for E-UTRAN in this context are ordinarily sent over the DL L1/L2 control channel (***physical downlink control channel***). EX1006, §2.3 ("allocation is sent [] on L1/L2 control channel"), ("allocated dynamically using the L1/L2 control channel"), FIG. 3, §2.1 ("L1/L2 control signaling"), FIG. 1.

It would have been obvious to apply Nokia476's suggestion (allocating uplink resources on DL L1/L2 control channel) to the predictable CATT115-Kuusela-TS_36_300 combination (*supra*, §XIII.B.1) such that the dynamically allocated resources for the new packet transmission in the different (second) HARQ process are sent on the DL L1/L2 control channel. EX1003, ¶¶147-148. A POSITA would have been motivated to implement the system in this manner, especially since E-UTRAN

provided efficient mechanisms for transmitting control signaling on the L1/L2 control channel, and it was the ordinary method of dynamically allocating uplink resources in the relevant timeframe (e.g., October 5, 2007) according to applicable standards. EX1006, §2.3.

Element [10]

Supra, Element [3]; EX1003, ¶149.

XV. [GROUND 2C] – Obviousness Based On CATT115-Kuusela-TS_36_300-Ranta (Claims 5-6)

Element [5.P]

To the extent the preamble is a limitation, Ranta discloses the recited "computer readable medium." EX1010, [0052]; *see also* [0053]-[0055], FIG. 1; *supra*, §IX.A. It would have been obvious to implement the CATT115-Kuusela-TS_36_300 system (e.g., the UE and eNB) with computer-readable media encoded with a computer program product according to Ranta's suggestion for at least the reasons described in §IX.B, Element [14.P]. EX1003, ¶150.

Element [5.1]

Supra, §XIII.B.2, Element [1.1]; EX1003, ¶151.

Element [5.2]

Supra, §XIII.B.2, Element [1.2]; EX1003, ¶152.

Element [6]

Supra, §XIII.B.2, Element [9]; EX1003, ¶153.

XVI. [GROUND 2D] – Obviousness Based On CATT115-Kuusela-Nokia476 (Claims 11, 13-14, 16)

Element [11.P]

To the extent the preamble is limiting, CATT115 discloses a method for collision resolution in E-UTRAN. EX1007, §2.1; *supra*, §XIII.B.1; EX1003, ¶154.

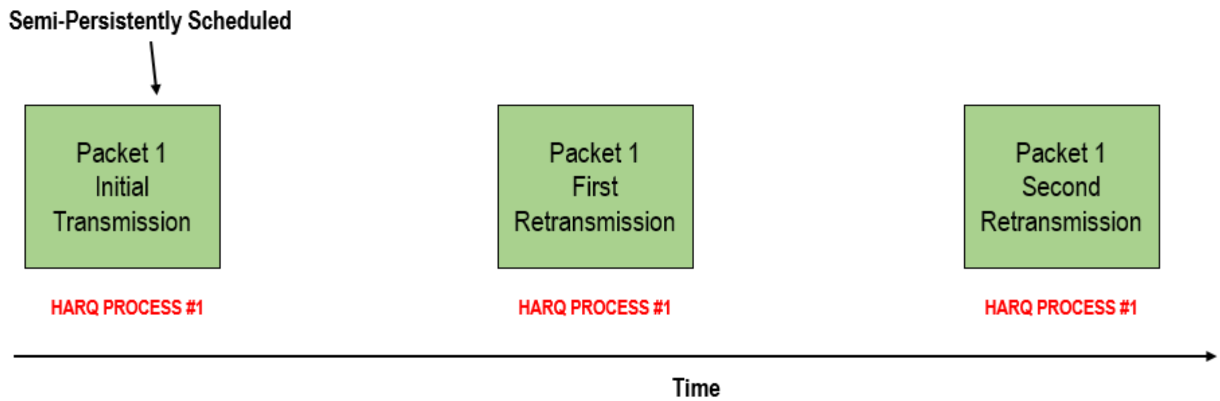
Element [11.1]

CATT115 discloses transmitting a packet re-transmission in a HARQ process. EX1007, §2.1; EX1003, ¶¶155-156, 45-46.

To the extent CATT115 does not expressly disclose "using a semi-persistently scheduled uplink resource," Nokia476 demonstrates this feature was well-known before the earliest possible priority date of the '480 patent (October 5, 2007). EX1003, ¶155. For example, Nokia476 explains that semi-persistent scheduling allows for release of persistently scheduled resources during "silence periods" of a voice call. EX1006, §2.3.

It would have been obvious to implement the resulting combination according to Nokia476's suggestion for semi-persistent scheduling, and a POSITA would have been prompted to do so for each of the reasons described above in the analysis of

Element [11.1] (§VIII.C.3).[6] EX1003, ¶156. Mr. Rysavy provided the following diagram showing an ordinary implementation of the CATT115-Kuusela-Nokia476 combination using semi-persistent scheduling according to Nokia476's suggestion:



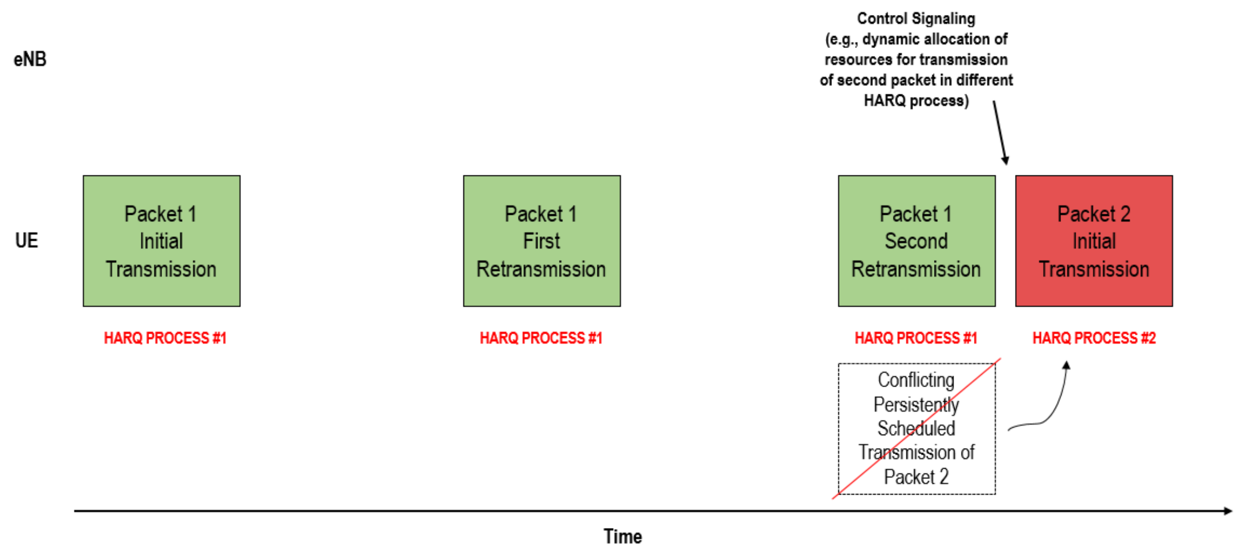
EX1003, ¶156.

[6] Specifically, the resulting combination in this ground is based on the teachings of CATT115, Kuusela, and Nokia476. A POSITA would have modified CATT115 according to Kuusela's suggestions (e.g., diverting the new packet transmission to a different HARQ process) for the reasons explained in detail above. *Supra*, §XIII.B.1; EX1003, ¶¶119-133. A POSITA would have further modified CATT115-Kuusela in view of Nokia476 to implement semi-persistent scheduling for the reasons described here (analysis of element [11.2]). EX1003, ¶¶68, 155-156.

Element [11.2]

CATT115 discloses dynamic allocation of resource units to a UE for a second retransmission of a first packet such that the second retransmission does not interfere with an initial transmission of a new packet in the same resource units. EX1007, §2.1 ("scheduler notices the UE that the 2nd retransmission will continue in different resource units from previous retransmission"). The UE transmits a new packet using the different resource units in response to their dynamic allocation. *Id.* To the extent CATT115 does not expressly disclose that the resources are for a different HARQ process or that the new packet (rather than the first packet) would be transmitted in the different HARQ process, Kuusela discloses these features. EX1008, [0023]-[0025]; *supra*, §XIII.A.

As explained in detail above (§XIII.B.1), it would have been obvious to modify CATT115 in view of Kuusela such that the UE would receive from the eNB dynamically allocated resources for transmitting the new packet in a different HARQ process, and in response, transmitting a new packet using the dynamically allocated resources in a different HARQ process. EX1003, ¶¶157-158.



EX1003, ¶158

Element [13]

As described above with respect to Elements [11.1]-[11.2] and in §XIII.B.1, the UE in the CATT115 receives the dynamic allocation of resources for transmission of the new packet in a second (different) HARQ process from an eNB (***network element***). EX1007, §2.1 ("MAC scheduler"); EX1006, §§2.1, 2.3 ("Node B"), FIGS. 1, 3; *supra*, Elements [11.1]-[11.2] and §XIII.B.1; EX1003, ¶159.

Element [14.P]

Supra, §XV, Element [5.P]; EX1003, ¶160.

Element [14.1]

Supra, Element [11.1]; EX1003, ¶161.

Element [14.2]

Supra, Element [11.2]; EX1003, ¶162.

Element [16]

Supra, Element [13]; EX1003, ¶163.

XVII. [GROUND 2E] – Obviousness Based On CATT115-Kuusela-Nokia476-TS_36_300 (Claims 12, 15, 17-20)

Element [12]

CATT115-Kuusela-Nokia476 provides the method of claim 11. EX1003, ¶¶154-158. As described in detail above, TS_36_300 further discloses the additional feature recited in claim 12 to at least the same extent as the '480 patent itself. EX1009, §11.1.2 ("E-UTRAN can allocate a predefined uplink resource for the first HARQ transmissions and potentially retransmissions to UEs"); *supra*, §XIII.B.2 (Element [9]); EX1003, ¶¶164, 145-146. It would have been obvious to implement the system based on CATT115-Kuusela-Nokia476 according to TS_36_300's suggestion here for the reasons described above, and the resulting system would persistently allocate the uplink resource both for the initial and retransmissions of the new packet in the second (different) HARQ process. *Supra*, §XII.B.2 (Element [9]); EX1003, ¶164.

Element [15]

Supra, Element [12]; EX1003, ¶165.

Element [17.P]

The CATT115-Kuusela-Nokia476-TS_36_300 combination provides a UE as

the recited "apparatus." EX1007, §2.1; EX1009, §5.4.1.5, FIG. 5.4.1.5; *supra*, §XIII.B.1; EX1003, ¶166.

Element [17.1]

For the reasons described in detail above, the predictable CATT115-Kuusela-Nokia476 combination transmits a packet-retransmission in a HARQ process using a semi-persistently scheduled uplink resource. *Supra*, §XVI (Element [11.1]); EX1003, ¶167. To the extent these references do not expressly disclose a HARQ functional unit, TS_36_300 confirms that such a functional unit was ordinarily provided in a UE apparatus according to E-UTRAN standards. EX1009, §5.4.1.5, FIG. 5.4.1.5 (depicting HARQ unit in UE). It would have been obvious to modify CATT115-Kuusela-Nokia476 further based on TS_36_300 to provide a HARQ functional unit for at least the reasons identified above in the analysis of Element [17.1] (§X.B). EX1003, ¶¶167, 83-84.

Element [17.2]

The resulting system in the predictable CATT115-Kuusela-Nokia476 combination receives a dynamic allocation of resources for transmitting a new packet in a second/different HARQ process, and in response, transmits a new packet using the dynamically allocated resources in the second/different HARQ process. *Supra*, §XV (Element [11.2]); EX1003, ¶¶178. It further would have been obvious to modify

CATT115-Kuusela-Nokia476 further based on TS_36_300 to provide a HARQ functional unit configured to perform HARQ related operations (including those recited in Element [17.2]), as described above. *Supra*, Element [17.1] (§§X.B, XVII); EX1003, ¶178.

Element [18]

Supra, Element [12]; EX1003, ¶169.

Element [19]

The UE in the CATT115-Kuusela-Nokia476-TS_36_300 combination receives the dynamic allocation of resources for transmitting in the second/different HARQ process from an eNB (***network element***). *Supra*, §XVI (Element [11.1]-[11.2]); EX1003, ¶170. TS_36_300 confirms the UE includes a receiver for receiving information such as the dynamically allocated resources from the UE. TS_36_300, §5.4.1.5, FIG. 5.4.1.5 (UE with receiver and antenna) (“receiver side”); EX1003, ¶170.

Element [20]

CATT115 discloses the apparatus embodied in a user equipment (UE). EX1007, §2.1 (“notices the UE”); EX1009, §5.4.1.5, FIG. 5.4.1.5 (depicting UE).; EX1003, ¶171.

XVIII. THE *FINTIV* FACTORS WEIGH IN FAVOR OF INSTITUTION

In *Apple Inc. v. Fintiv, Inc.*, the Board enumerated six factors that provide a "holistic view" as to "whether efficiency, fairness, and the merits support the exercise of authority to deny institution in view of an earlier trial date in [a] parallel proceeding." IPR2020-00019, Paper 11 at 2-3 (PTAB "precedential" Mar. 20, 2020) ("*Fintiv I*"). Guided by precedent, Petitioner took affirmative steps to promote the Board's efficiency and fairness goals. Petitioner initiated this proceeding with exceptional diligence, filed a single petition within a mere seven weeks of learning of Patent Owner's asserted claims, and provided a stipulation far more expansive than the example in *Sand Revolution* to eliminate any possibility of overlapping prior art issues between the instituted IPR proceeding and the Related Litigation. These facts, paired with the strong merits of Grounds 1(A)-2(E), provide compelling reasons to institute. *Sand Revolution II, LLC v. Continental Intermodal Group*, IPR2019-01393, Paper 24, 12 (PTAB "Informative" June 16, 2020).

Relevant Facts—On June 17, 2020, Patent Owner filed twelve separate infringement actions against Petitioner involving twelve unrelated patents asserted against dozens of unrelated products. *See* EX1100. These twelve lawsuits are concurrently pending in the Western District of Texas ("the Court") before the Honorable Judge Alan D. Albright. *Id*. The action involving the '480 patent was assigned

Case No. 6:20-cv-00544 ("the Related Litigation"). The remaining eleven lawsuits are identified by different cases numbers and are not formally consolidated.

Patent Owner served its preliminary infringement contentions on October 9, 2020. *See* EX1101, 8, 14. Petitioner's preliminary invalidity contentions are due December 7, 2020. *Id*. On November 30, 2020, Petitioner stipulated in the Related Litigation that, if *inter partes* review is instituted on Grounds 1(A)-2(E) in this proceeding, Petitioner will not pursue in the Related Litigation the same Grounds 1(A)-2(E) from this IPR *nor any other possible prior art grounds based on a primary reference* from this IPR (the CATT183 primary reference or the CATT115 primary reference). *See* EX1102.

The Court set a *Markman* hearing for April 15, 2021, and the parties are scheduled to exchange terms for construction on December 21, 2020. *See* EX1103; EX1101, 9, 15. Per the Court's default order, fact discovery will formally open on April 19, 2021, one business day after the *Markman* hearing. *See* EX1104, 9.

For purposes of planning earlier dates throughout discovery, etc., the Court set a placeholder trial date for all twelve cases on the same day—April 11, 2022—but promptly informed the parties that "the Court does not intend of trying all 12 patents in one trial." EX1105, 1. In other words, a jury trial is scheduled for April 11, 2022, but neither the Court nor any party knows which one of the twelve asserted

patents will be the subject of the trial on that date. This placeholder trial date was set for all twelve cases "due to logistics and to provide flexibility" up through the *Markman* stage, but there is significant uncertainty as to whether the '480 patent will be the subject of a jury trial starting on April 11, 2022 or a much later jury trial. *Id.*

The parties were also informed that the Court "currently has no intention of consolidating" the twelve lawsuits for a jury trial. EX1106, 1. In this communication, the Court acknowledged the possibility that a subset of "certain patents" among the twelve patents "may" be consolidated. *Id.* But again, even in those circumstances, there is significant uncertainty as to whether the '480 patent will be grouped in that possible subset of "certain patents" and whether that subset will be the subject of a jury trial starting on April 11, 2022 or a much later trial date. *Id.*

Given the filing date of this Petition, the Board's Institution Decision and Final Written Decision will likely issue in early June of 2021 and 2022, respectively.

Factor 1 (Stay)—No party in the Related Litigation has requested a stay at this time. Huawei currently plans to seek a motion to stay after the Board's decision to institute IPR here because, in Judge Albright's court, a motion filed earlier would be premature. Again, the facts at play here are unique. There are twelve distinct lawsuits (asserting twelve unrelated patents) all unrealistically scheduled for trial on the same date. In such unique circumstances, it is unclear how Judge Albright would

rule on a motion to stay for the particular lawsuit involving the '480 patent, especially after IPR is instituted against the '480 patent. This cloud of uncertainty means Factor 1 is neutral.

Factor 2 (Trial Date)—While the Court set April 11, 2022 as a placeholder date for trial, it is far from certain whether the '480 patent will be part of that trial because "the Court does not intend of trying all 12 patents in one trial." EX1105, 1. The parties were already informed that the Court currently has no intention of consolidating any of the twelve separate actions, and it is simply not possible to conduct twelve trials all starting on April 11, 2022. *Id.*; EX1106, 1. While the Court "*may*" consolidate a subset of "certain patents" among the twelve, there is significant uncertainty as to whether the '480 patent will be part of that subset and whether that subset will be the subject of a jury trial starting on April 11, 2022. EX1106, 1. The only certainty at this time is that a significant number of the 12 patents will not be part of the April 11, 2022 trial. EX1105, 1. And the only plausible solution is to spread the trial dates out over a period of time, which will almost certainly result in later trial dates in multiple cases. Presently, there is no hint as to how the scheduling shuffle will play out.

The *Fintiv* panel noted that the Board "generally take[s] courts' trial schedules at face value absent some strong evidence to the contrary." *Apple Inc. v. Fintiv, Inc.*,

IPR2020-00019, Paper 15, 13 (PTAB, "informative," May 13, 2020) ("*Fintiv II*"). For the reasons detailed above, such "strong evidence" exists on this record. Due to Patent Owner's litigation tactics, neither the Court nor any party knows which one of the twelve asserted patents will be the subject of the trial starting on April 11, 2022. There is, in effect, no *certain* date for a jury trial that specifically addresses the '480 patent.

The "informative" guidance in *Sand Revolution* aligns with the facts of this case. *Sand Revolution*, IPR2019-01393, Paper 24 at 8-10. Even if the '480 patent was selected as the particular patent for a jury trial on April 11, 2022 (mere speculation at this time), the narrow gap in time between the Court's placeholder trial date (April 11, 2022) and the Board's projected Final Written Decision (June of 2022) is just two months. The panel in *Sand Revolution*, also facing meaningful questions of uncertainty about the trial date, weighed Factor 2 "marginally" *against* denial with a three-month time gap. *Id.* The *Sand Revolution* guidance demonstrates the proper result when the district court's "evolving schedule" makes it "unclear" when the trial would be held. *Id.* A similar lack of clarity exists in this case but for a slightly different reason—the placeholder trial date is plainly overbooked several times over, and there is significant uncertainty as to whether the '480 patent will be addressed in the April 11, 2022 jury trials or one of the inevitable later jury trials.

Similarly, the Board's analysis in *Google LLC, et al. v. Parus Holdings, Inc.* is compelling. *See* IPR2020-00846, Paper 9 at 12-14 (PTAB Oct. 21, 2020). There, the district court reserved a broad range of "predicted" trial dates but declined to specify further. *Id*. (noting a trial date range of July 12-30, 2021, and further noting the court's statement that it was "not going to pick a date right now"). With "only three months" between the range of trial dates and a final written decision, the Board deemed Factor 2 "neutral" based on "substantial uncertainty in the Texas court's 'Predicted Jury Selection/Trial' date." *Id*.

The two-month time gap presently at issue is narrower than *Sand Revolution* and the trial date uncertainty is comparable to *Google v. Parus*. The well-reasoned analysis by the Board in those two cases weighed Factor 2 either against denial or neutral, respectively. A similar outcome is appropriate here.

Factor 3 (Investment)—The Related Litigation is currently in its infancy. Petitioner has yet to serve its preliminary invalidity contentions, and the parties have yet to exchange proposed terms for construction. Petitioner acted promptly in response to Patent Owner's identification of asserted claims in preliminary infringement contentions, filing this Petition only about seven weeks after the asserted claims were finally revealed for the twelve asserted patents. *See* EX1101, 8, 14.

At the projected date of institution (June of 2021), the fact discovery period

will be just past the quarter-way mark, and expert reports still about five months out. *See* EX1103 (*Markman* hearing set for April 15, 2021); EX1104, 9-10 (30-week fact discovery period opens one business day after *Markman*). Beyond a *Markman* order, which is not dispositive here because the Petition does not rise or fall with any specific construction, the Court will almost certainly have not issued any substantive orders relevant to validity over the prior art.

The facts here compare favorably to *Fintiv*. In that case, also co-pending with litigation at the Western District of Texas, the petitioner filed *five months* after receiving preliminary infringement contentions—less than *two months* here. *See Fintiv II* at 9. There, "[a]t the time of filing the Petition, the parties were in the midst of preparations for the *Markman* hearing," while here, the parties have not even exchanged terms. *Id*.

The "informative" guidance in *Sand Revolution* is telling here too. By the time of institution in this proceeding, the Related Litigation will be at a similar posture where "aside from the district court's *Markman* Order, much of the district court's investment relates to ancillary matters untethered to the validity issue itself." *Sand Revolution*, IPR2019-01393, Paper 24 at 10-11. The parallels are also notable because:

> [M]uch work remains in the district court case as it relates to invalidity: fact discovery is still ongoing, expert reports are not yet due, and substantive motion practice is yet to come. Thus, although the parties and the district court have invested effort in the related district court litigation to date, further effort remains to be expended in this case before trial.

Id. at 11 (internal citation omitted). Given the alignment with *Sand Revolution*, Factor 3 should weigh "only marginally, if at all, in favor of exercising discretion to deny." *Id.* Alternatively, it is reasonable to characterize this factor as firmly "neutral" given Petitioner's even greater diligence in preparing this Petition as compared to petitioner in the *Fintiv* decision.

Factor 4 (Overlap)—Factor 4 strongly supports institution. Petitioner stipulated in the Related Litigation that, if the IPR is instituted on Grounds 1(A)-2(E) in this proceeding, Petitioner will not pursue in the Related Litigation the same Grounds 1(A)-2(E) from this IPR *nor any other prior art grounds based on a primary reference* from this IPR. EX1102. Petitioner's contingent stipulation removes the possibility of the Board deciding prior art issues that overlap with invalidity grounds in an earlier jury trial (if any). Critically, this stipulation is significantly broader than what the Board favorably considered in the informative *Sand Revolution* case. *See* IPR2019-01393, Paper 24 at 11-12.

Factor 5 (Parties)—Because the parties here and at the District Court are the same, Factor 5 favors denial if trial precedes the Board's Final Written Decision and favors institution if the opposite is true (due to the 35 U.S.C. 315(e)(2) estoppel provision). *Google*, IPR2020-00846, Paper 9 at 20-21 ("[W]e decline to speculate as to whether we are likely to address the challenged patent before the Texas court. Thus, [Factor 5] is neutral."). Neither circumstance can be confirmed in this case without improper speculation because the *actual* date of a jury trial involving the '480 patent is uncertain. For the reasons detailed above, the District Court has only established a placeholder date for an entire set of twelve patent lawsuits, along with an explanation to the parties that "the Court does not intend of trying all 12 patents in one trial." EX1105, 1. Under these unique circumstances, Factor 5 is neutral.

Factor 6 (Merits and Other Circumstances)—The merits of this Petition are particularly strong. Section VIII-XVII above presents grounds based on two different primary references (CATT183 and CATT115) against the Challenged Claims. As discussed, the prior art and arguments at issue here are materially different from those considered by the Examiner during prosecution. The strength of the merits alone is enough to outweigh any inefficiencies born of parallel litigation. *See Fintiv* at 15.

And there are additional circumstances that also favor institution, such as the

effect on "the economy [and] the integrity of the patent system." *Consolidated Trial Practice Guide* ("*CTPG*"), p.56 (quoting 35 U.S.C. § 316(b)). Relevant to the former, Patent Owner, an entity specializing in patent licensing and negotiation, is asserting the '480 patent's overbroad claims against Petitioner's base station equipment that implements one of the most well-known and widely-adopted standard protocols for wireless communications—LTE. *See* EX1009, 5-14. Fully vetting a twelve-year-old patent (PCT filed 2008) only now alleged to cover use of a pre-existing standard that the public has come to rely on would be beneficial to the economy.

The integrity of the patent system equally weighs in favor of institution. The obviousness analyses in this Petition show that the '480 patent's Challenged Claims are too broad, and the exceedingly thin prosecution record contains no express reasons indicating why the Examiner determined to allowed the patent in the first place (*see supra* Section V.C). AIA trials were intended to "improve patent quality and limit unnecessary and counterproductive litigation costs." *CTPG*, p.56 (quoting H.R. Rep. No. 112–98, pt. 1, at 40 (2011)). This case provides an opportunity to fulfill those objectives. The quality of the '480 patent would undoubtedly be improved by cancelling the unpatentable claims presently under challenge. And such a result could avert future litigation (and licensing) costs caused by Patent Owner's

continued assertion efforts.

For all these reasons, Factor 6 and the *Fintiv* Factors as a whole strongly favor institution.

XIX. CONCLUSION

Petitioner requests that IPR be instituted on Grounds 1(A)-2(E), and submits that all Challenged Claims should be found unpatentable.

Respectfully submitted,

Dated: 11/30/2020

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(Control No. IPR2021-00229)

CERTIFICATION UNDER 37 CFR §42.24

Under the provisions of 37 CFR §42.24(d), the undersigned hereby certifies that the word count for the foregoing Petition for *inter partes* review totals 13,957 words, which is less than the 14,000 allowed under 37 CFR §42.24.

Respectfully submitted,

Dated: 11/30/2020 /Nicholas W. Stephens/
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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§42.6(e)(4)(i) *et seq.* and 42.105, the undersigned certifies that on November 30, 2020, a true and correct copy of the foregoing PETITION FOR INTER PARTES REVIEW OF U.S. PATENT NO. 8,429,480, and all supporting exhibits were provided via Federal Express, cost prepaid, to the Patent Owner by serving the correspondence address of record as follows:

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